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# Objective Assessment of Quality of Services for (QoS) for Basic Wireline, Cellular and Broadband Service Providers - Andhra Pradesh Circle

## Report: January-February-March - 2010

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Prepared for: **Telecom Regulatory Authority of India**

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A specialist unit of IMRB International

# Preface

TRAI, the regulatory watch dog for the Quality of Service for the telecom services – Basic (Wireline), Cellular Mobile (Wireless) and Broadband has commissioned this study with the objective of measuring Quality of Services under the parameters as per the published notifications. The study, from the execution perspective, has been divided into two modules – Survey module and Audit module.

The Survey module has been commissioned with the objective of gauging the subscriber feedback on Quality of Services by way of primary survey and comparing them with quality of service benchmarks stipulated by TRAI. In addition, Survey module would also measure the compliance of 'Telecom Consumer Protection and Redressal of Grievances Regulations, 2007'.

The Audit module would assess the Quality of Service of telecom operators (Basic (Wireline), Cellular Mobile (Wireless) and Broadband services) by auditing the service level records maintained by the operators, conducting drive tests as well as live measurements and comparing them with quality of service benchmarks stipulated by TRAI.

For the ease of execution both the modules have been commissioned as two separate exercises. However, the findings of each module would feed into the justification of the other module.

The Survey and Audit modules for various circles within the Zones, due the sheer scale of data collection, have been distributed across various Half Yearly periods. The auditor - IMRB International carried out the audits across UP (East), UP (West), Andhra Pradesh, Andhra Pradesh and West-Bengal circles in the January-February-March 2010 period. **This report details the performance of various service providers in Andhra Pradesh circle against Quality of Services benchmarks for various parameters laid down by TRAI in respective regulations for Basic (Wireline), Cellular mobile (Wireless) and broadband services.**

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# 1.0 Background

The Telecom Regulatory Authority of India (TRAI) has a critical mandate to protect the interest of telecom consumers in addition to various other functions bestowed upon it. As part of the license conditions to telecom operators, it has the power and authority to measure the Quality of Service provided by various govt. (BSNL & MTNL) and private telecom operators. The parameters that need to be measured for Basic (Wireline) and Cellular Mobile (Wireless) services have been specified in the TRAI notification on Quality of Services of Basic (Wireline) and Cellular Mobile (Wireless) services dated 20th March, 2009. The parameters for Broadband Service have been specified in the TRAI notification for Quality of Services of Broadband Service Regulation, 2006

***The study is being conducted broadly in two modules:***
***(i) Survey module and***
***(ii) Audit module***

IMRB has been carrying out this exercise for TRAI since December 2007 to assess the quality of services being provided by Basic (Wireline), Cellular Mobile (Wireless) and Broadband service providers.

The study is being conducted broadly in two modules. They are:

**Survey module:** To obtain subscriber feedback on quality of services by way of primary survey and to check the 'Implementation and effectiveness of Telecom Consumer Protection and Redressal of Grievances Regulations, 2007'

**Audit module:** To assess the quality of service of telecom operators (Basic (Wireline), Cellular Mobile (Wireless) and broadband services) by auditing the service level records maintained by the operators, conducting drive tests as well as live measurements and comparing them with quality of service benchmarks stipulated by TRAI

This report highlights the findings for the Audit module for Andhra Pradesh circle that was covered in the period of January – March 2010. The primary data collection and verification of records maintained by various operators of Basic (Wireline), Cellular Mobile (Wireless) and broadband services was undertaken by IMRB International during the period January – March 2010.

# 2.0 Objectives And Methodology

The primary objective of the Audit module is to Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI). Following are the key activities undertaken by Auditors during the Audit process conducted at the operator's premises

***All Network related and Non network related parameters notified by TRAI in various regulations were Audited***

1. **Verification of the data submitted by service providers:** This involved verification of the quarterly Performance Monitoring Reports (PMR's) and monthly Point of Interconnect (POI) Congestion reports being submitted by various service providers. The raw data in the records maintained by service providers was audited to assess the book keeping methodology.
2. **Live measurement for three days:** Network performance of service providers was assessed for three days in the month in which the Audit was carried out. Live figures from the server/ NMS software were recorded for various network related parameters.
3. **Data verification for the month in which Audits were carried out:** Subsequent to the visits for Audit during the live measurement at various Exchanges/ISP Nodes/Exchanges, data for all the network and Non network related parameters was collected from various service providers for the complete month in which the Audit was carried out. Raw data/records pertaining to these were also verified on sample basis to check the veracity of data provided by the operators.
4. **Live calling:** Live testing was done on a sample basis to check efficiency of the customer care, inter operator call assessment, Back check calls for service provisioning and fault repair

- Any changes or discrepancies found in the methodology were reported to the service providers and changes were suggested by IMRB Auditors.
- PMR verification was done as per the new parameters being reported to TRAI by all operators.
- Live measurement and 1 month data collection was done as per the new regulations published by TRAI on 20th March, 2009.
- Separate formats were designed each for Basic (Wireline), Cellular mobile (Wireless) and Broadband services to collect the information on various parameters

# Section A: WIRELINE

# 3.0 Sampling Methodology

## 3.1 Sampling for Basic (Wireline) services

- For BSNL the sample of exchanges was selected was spread across 5% of exchanges and 10% of SDCA's in the entire service.
- For rest of the service providers (private service providers) data was collected pertaining to all the exchanges present in the circle/service area at their main exchange
- For Reliance the data was obtained from their central NOC at Mumbai
- Following service providers are providing Basic (Wireline) service in Andhra Pradesh circle –

***The satisfaction level of subscribers was collected on a four-point Likert scale.***

| Circle | Andhra Pradesh |
|---|---|
| Operator 1 | BSNL |
| Operator **2** | Airtel |
| Operator **3** | TTSL |
| Operator **4** | RCOM |

# 4.0 Audit methodology

## 4.1 Basic (Wireline) Services

Following table explains the audit methodology for Basic (Wireline) services:-

| Sl. No. | Parameters | One month data verification | Live measurement | Live calling |
|---|---|---|---|---|
| 1 | Provision of telephone after registration of demand | YES | ---- | YES |
| 2 | Fault incidence/clearance related statistic | YES | | |
| 2.1 | *- Total number of faults registered per month* | YES | | YES |
| 2.2 | *- Fault repair by next working day* | YES | | YES |
| 3 | Mean Time to Repair (MTTR) | YES | | |
| 4 | Call Completion Rate (CCR) | YES | YES | |
| 5 | Metering and billing credibility – billing complaints | YES | | YES |
| 6 | Customer care promptness | YES | | |
| 6.1 | *- Shifting of telephone line* | YES | | YES |
| 6.2 | *- Processing closure request* | YES | | YES |
| 6.3 | *- Processing of additional supplementary services* | YES | | YES |
| 7 | Response time to customer | YES | | |
| 7.1 | - While call is getting connected and answered | YES | | YES |
| 7.2 | - While call is answered by operator (voice to voice) | YES | | YES |
| 8 | Time taken to refund of deposits after closure | YES | | YES |

* In addition to above verification of records for PMR submitted during July to September 2009 was carried out for all network and non network related parameters.

{**Note**: - A more detailed explanation of parameter wise audit methodology for Basic (wireline) services is explained in Annexure II}

# 5.0 Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Basic (Wireline) and Broadband service providers during the period starting from January to March 2010 in Andhra Pradesh circle. The executive summary encapsulates the key findings of the Audit by providing: -

- *"Service provider performance report"* for Basic (Wireline) service , which gives a glimpse of the performance of various operators against the benchmark specified by TRAI, during the month in which the Audit was carried out by IMRB Auditors
- *"Parameter wise critical findings"* for Basic (Wireline) service: This indicates key observations and findings from different activities carried out during the Audit process

## 5.1 Service provider performance report based on one month data verification – Basic (Wireline) Services

| Parameters | Benchmarks | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Faults incidences ( No. of faults/100 Subs./month) | ≤5 | 3.28 | 2.8 | 0.3 | 1.41 |
| % of faults repaired by next working day | ≥ 90% | 92.61% | 98.75% | 81.14% | 99.49% |
| % of faults repaired within 3 days | 100% | 95.62% | 99.84% | 92.22% | 100.00% |
| Faults pending for> 3days and ≤7 days | Rent rebate of 7 days | 100.00% | 100.00% | 100.00% | NA |
| Faults pending for > 7 days and ≤15 days | Rent rebate of 15 days | 100.00% | 100.00% | NA | NA |
| Faults pending for > 15 days | Rent rebate of 1 month | 100.00% | NA | NA | NA |
| Mean Time to Repair (MTTR) | ≤ 8 Hrs | 7.74 | 5.01 | 8.78 | 3.02 |
| Call Completion Rate (CCR) | ≥ 55% | 70.58% | 93.93% | 99.70% | NA |
| Answer to Seizure ratio (ASR) | ≥ 75% | 58.42% | NA | NA | 90.71% |
| No. of POIs with congestion > 0.5% | ≤ 0.5% | 0 | 0 | 0 | 0 |
| Metering and billing credibility - Number of bills disputed during over a billing cycle | ≤ 0.1% | 0.05% | 0.08% | 0.01% | 0.01% |
| Resolution of billing complaints within 4 weeks | 100% | 100.00% | 100.00% | 95.83% | 100.00% |
| Period of applying credit / waiver | ≤ 1 week | 100.00% | 100.00% | 100.00% | 100.00% |
| Closure within 7 days | 100% | 98.74% | 100.00% | 94.26% | 100.00% |
| Response time to customer for assistance | | | | | |
| % age calls getting connected and answered | ≥ 95% | 99.96% | 98.29% | 96.40% | 100.00% |
| % age call answered by operator in 60 seconds | ≥ 90% | 97.66% | 95.48% | 87.24% | 91.00% |
| Time taken for refund of deposits after closures within 60 days | 100% | 96.57% | 100.00% | 100.00% | NA |

{*Note: For BSNL data pertains to the sample 5% of exchanges audited during the audit period, whereas for rest of the operators figures pertain to all the exchanges present in the circle}

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

**B'mar**k = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

## Summary of Live Measurement Results – Wireline Services

| Parameters | Benchmarks | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| % of faults repaired by next working day | ≥ 90% | 39.17% | 93.33% | 60.00% | 46.67% |
| % of faults repaired within 3 days | 100% | 76.57% | 100.00% | 93.33% | 83.33% |
| Call Completion Rate (CCR) | ≥ 55% | 65.91% | 90.20% | 99.84% | NA |
| Answer to Seizure ratio (ASR) | ≥ 75% | 54.57% | NA | NA | 90.11% |
| Resolution of billing complaints within 4 weeks | 100% | 87.50% | 95.00% | 100.00% | 100.00% |
| Response time to customer for assistance | | | | | |
| % age calls getting connected and answered | ≥ 95% | 100.00% | 100.00% | 100.00% | 100.00% |
| % age call answered by operator in 60 seconds | ≥ 90% | 100.00% | 100.00% | 98.00% | 100.00% |

### Critical findings and Key take outs: Basic (Wireline) services

The Basic (Wireline) services audit for Andhra Pradesh circle broadly indicates that all the service providers could meet benchmarks as specified by Telecom Regulatory Authority of India on most of the parameters.

The live calling results were found to be different from the 1 month audit data collection in certain places. To some extent the difference can be attributed to the smaller sample size undertaken for the live calling. For live measurements conducted to assess Call Completion Rate (CCR) it was found that the operators who are reporting the same to TRAI were meeting the benchmark.

The parameter wise key takeouts for the wireline service providers for the Andhra Pradesh circle are as under –

*Fault incidence / clearance statistics*

- Fault repair is a pain point for Tata subscribers as only 81% of the total complaints registered were repaired within 24 hrs which is significantly short of TRAI specified benchmark of >90%.
- For live calling carried out by IMRB auditors only Airtel met the TRAI benchmark with more than 90% of subscribers claim that fault was repaired within 24 hrs.
- For fault repair within 3 days all service providers are meeting TRAI specified benchmark

*Traffic statistics (CCR & ASR)*

- All service providers comfortably meets the benchmark on CCR parameter both during month in which audit was carried out and three days when live measurement was carried out in auditor's presence at various exchanges
- RCOM reports ASR in place of CCR and comfortably meets TRAI benchmark although BSNL falls short of benchmark on ASR

*Metering and billing credibility*

- All service providers meet TRAI specified benchmark with percentage billing complaints being less than equal to 0.1% of the total bills generated.
- Also all the complaints registered were resolved within the time period stipulated by TRAI for all service providers except Tata

*Response time to customer for assistance*

- Tata falls short of TRAI specified benchmark for calls answered by the operator in 60 seconds.
- However for the live calling carried out by IMRB auditors all service provider comfortably meets the TRAI specified benchmark

*Time taken for refund of deposits after closure*

- All service providers were found to meeting TRAI benchmark on this parameter
- There were no cases of refunds observed for RCOM

*Level 1 service*

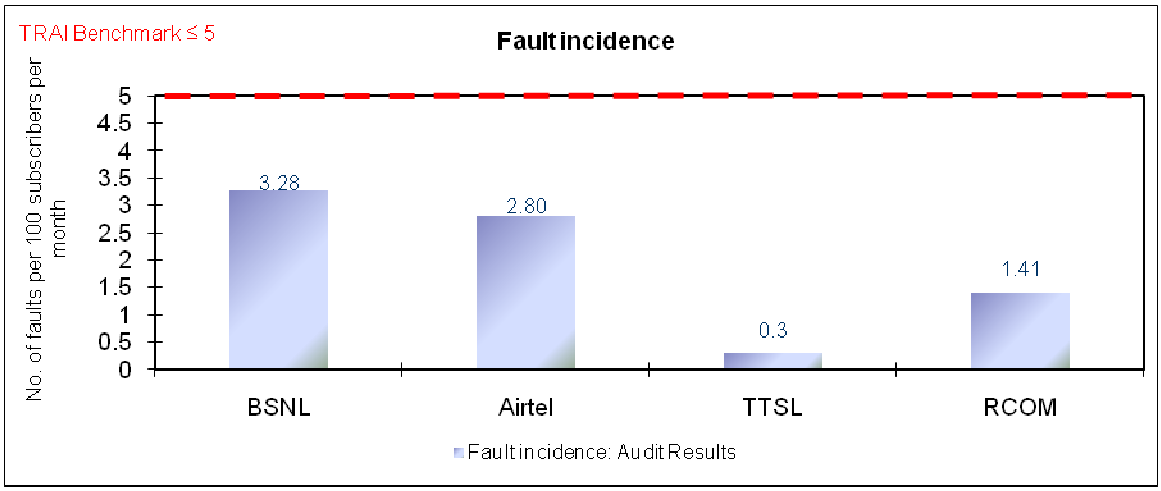
| Level 1 services | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|
| Total no. of calls made | 360 | 30 | 30 | 30 |
| Calls answered in 60 sec | 357 | 30 | 30 | 30 |
| Calls answered after 60 sec | 3 | 0 | 0 | 0 |

To test the efficiency of level 1 services (Trunk booking, Child helpline, Women helpline, Airline booking, Fire, Police, Railways) offered by various service providers. 360 calls were made for BSNL to different numbers and time taken to answer the call was noticed. Out of which 357 of calls made were answered in 60 seconds. For private service providers 100% of calls were answered within 60 seconds

# 6.0 Detailed findings – Includes comparison between Live calling/Live measurements and One month data collection for Basic Wireline Services

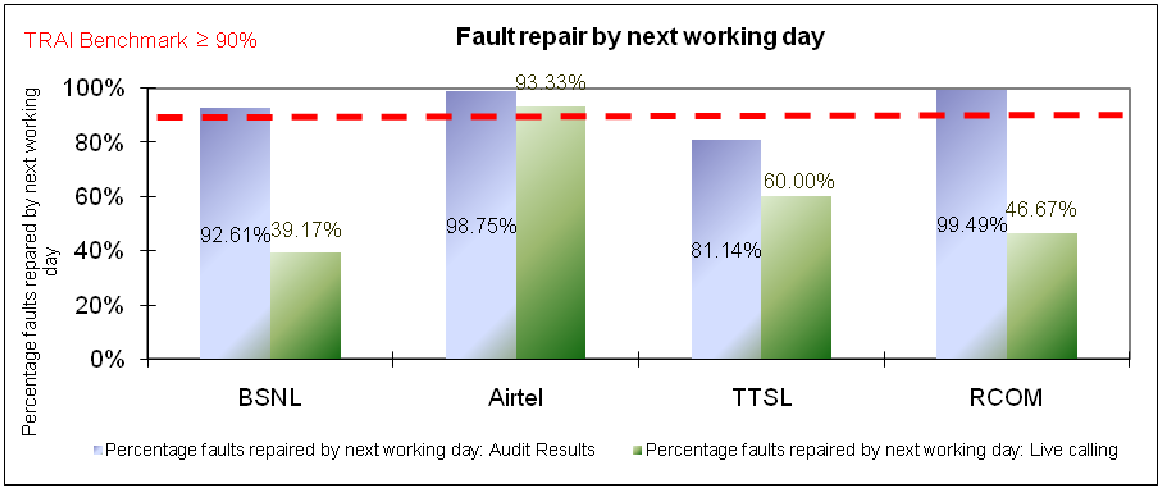
## 6.1 Graphical/Tabular Representations for Basic (Wireline) services

### Fault incidence



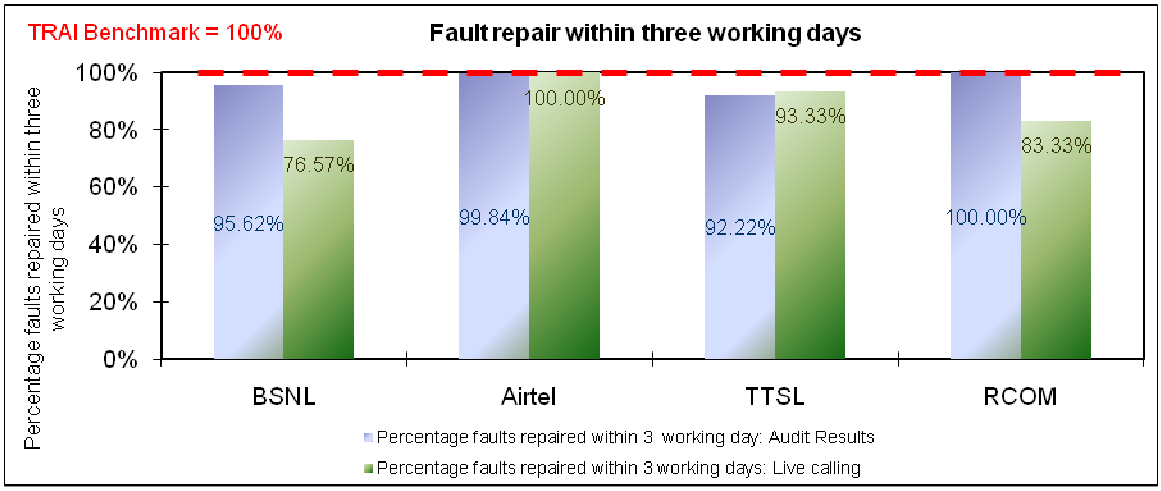

All operators are meeting the benchmark

### Fault repair/Restoration time (Comparison between one month audit results and live calling results)




**One month**
Operator meeting benchmark: BSNL, Airtel, RCOM
Operator not meeting benchmark: TTSL

**Live calling**
Operator meeting benchmark: Airtel
Operator not meeting benchmark: BSNL, TTSL, RCOM




**One month**

Operator meeting benchmark: RCOM

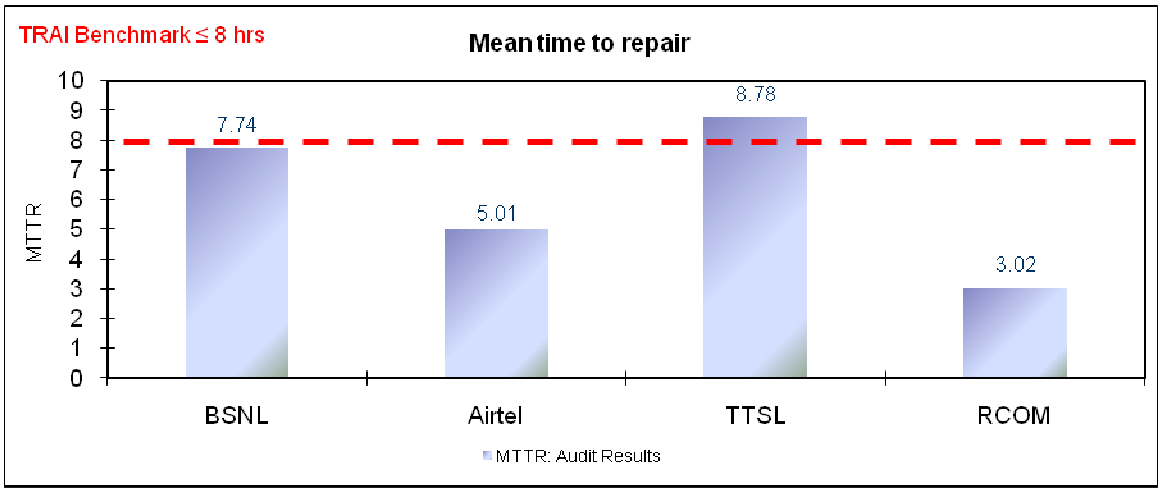
Operator not meeting benchmark: BSNL, Airtel, TTSL

**Live calling**

Operator meeting benchmark: Airtel

Operator not meeting benchmark: BSNL, TTSL, RCOM

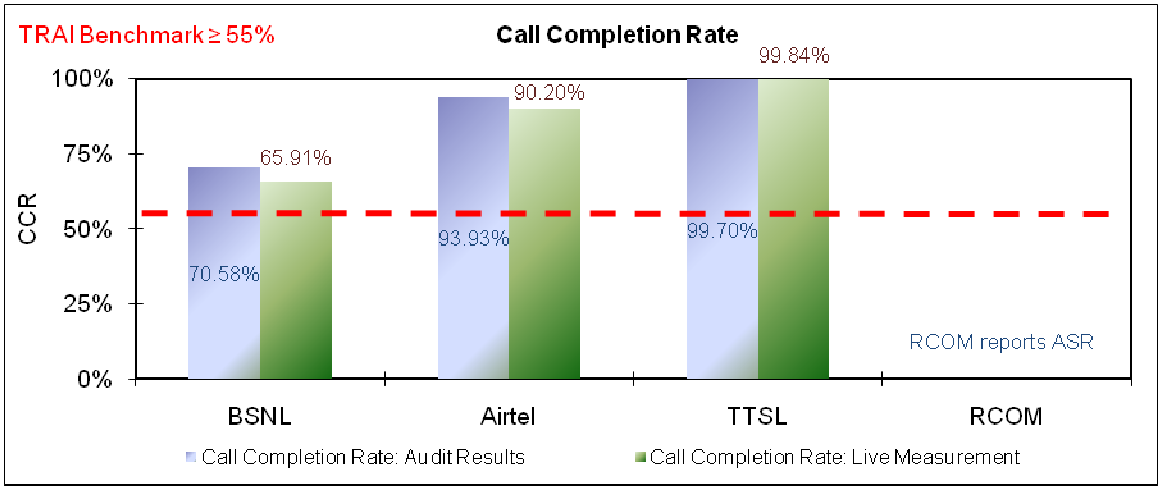
**Mean time to repair**




Operator meeting benchmark: BSNL, Airtel, RCOM

Operator not meeting benchmark: TTSL

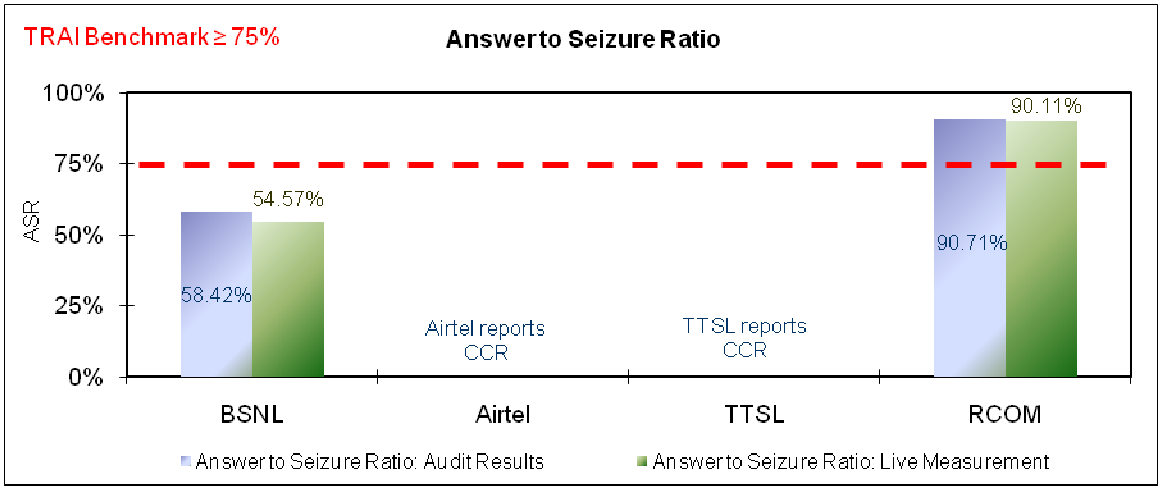
**Call completion rate (Comparison between one month audit results and three day live measurement)**




**One month**
All operators are meeting the benchmark

**Live measurement**
All operators are meeting the benchmark

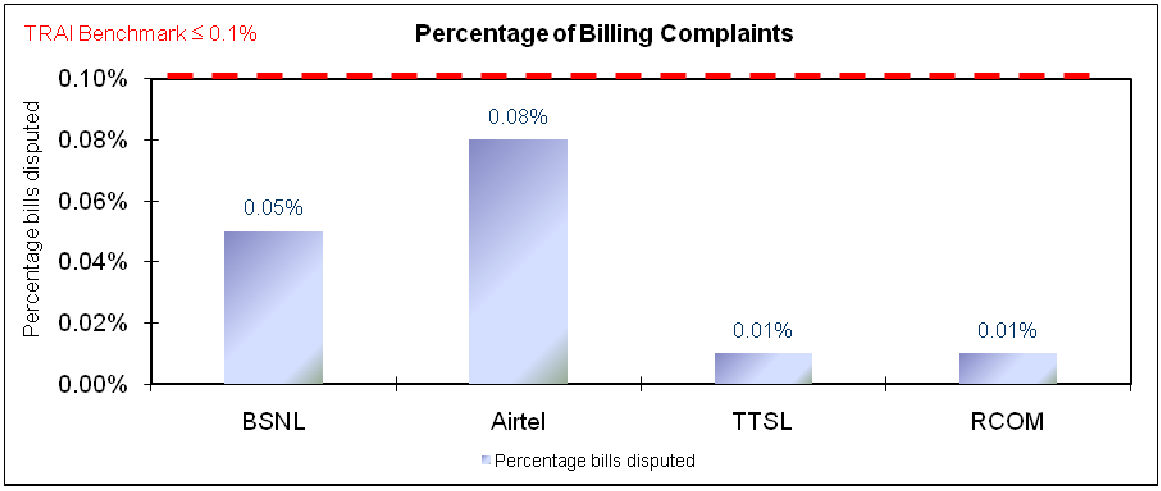
**Answer to Seizure Ratio (Comparison between one month audit results and three day live measurement)**




**One month**
Operator meeting benchmark: RCOM
Operator not meeting benchmark: BSNL

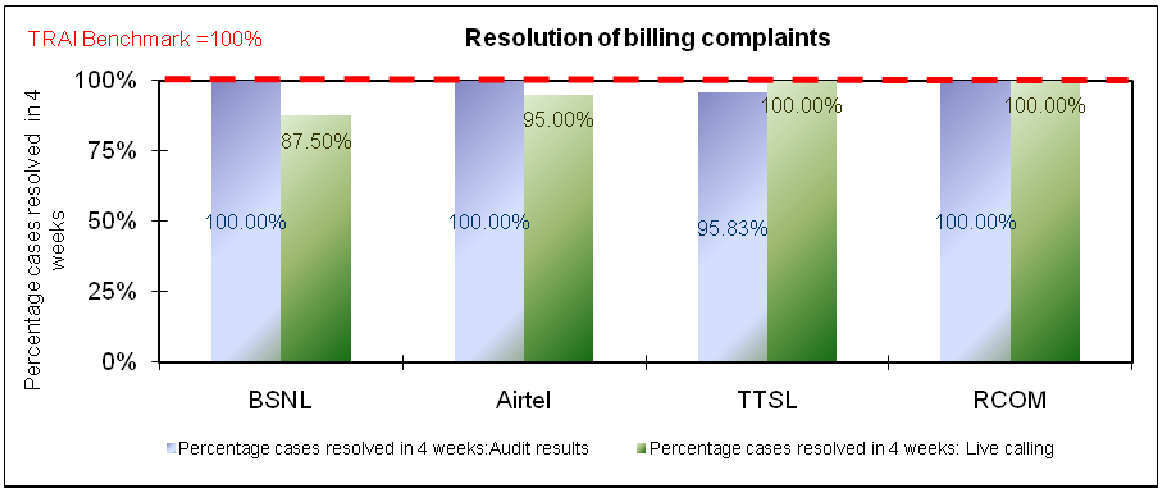
**Live measurement**
Operator meeting benchmark: RCOM
Operator not meeting benchmark: BSNL

**Percentage bills disputed**




All operators are meeting the benchmark

**Resolution of billing complaints - postpaid (Comparison between one month audit results and live calling results)**




**One month**

Operator meeting benchmark: BSNL, Airtel, RCOM

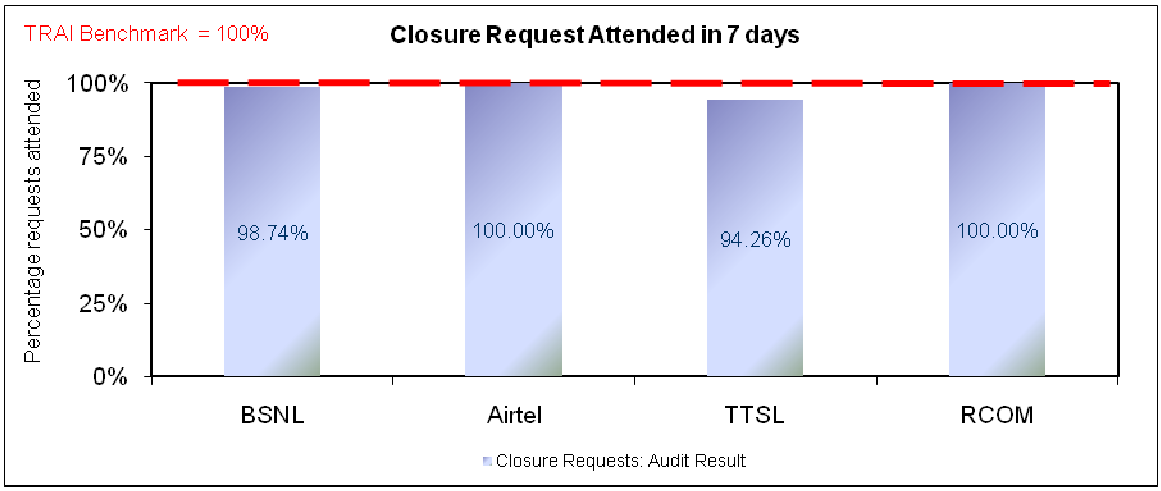
Operator not meeting benchmark: TTSL

**Live calling**

Operator meeting benchmark: TTSL, RCOM

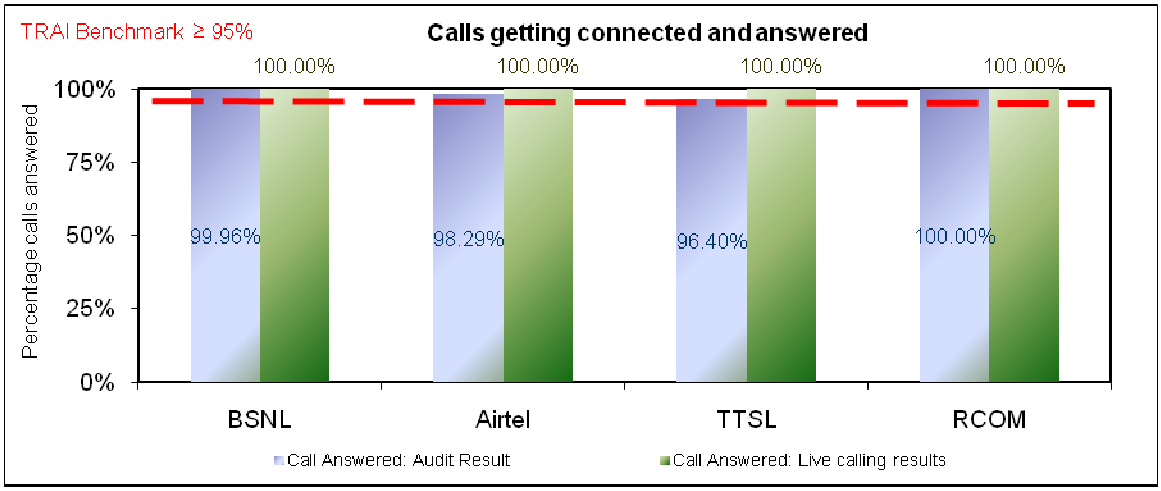
Operator not meeting benchmark: BSNL, Airtel

## Closure requests attended within 7 days




Operator meeting benchmark: Airtel, RCOM
Operator not meeting benchmark: BSNL, TTSL

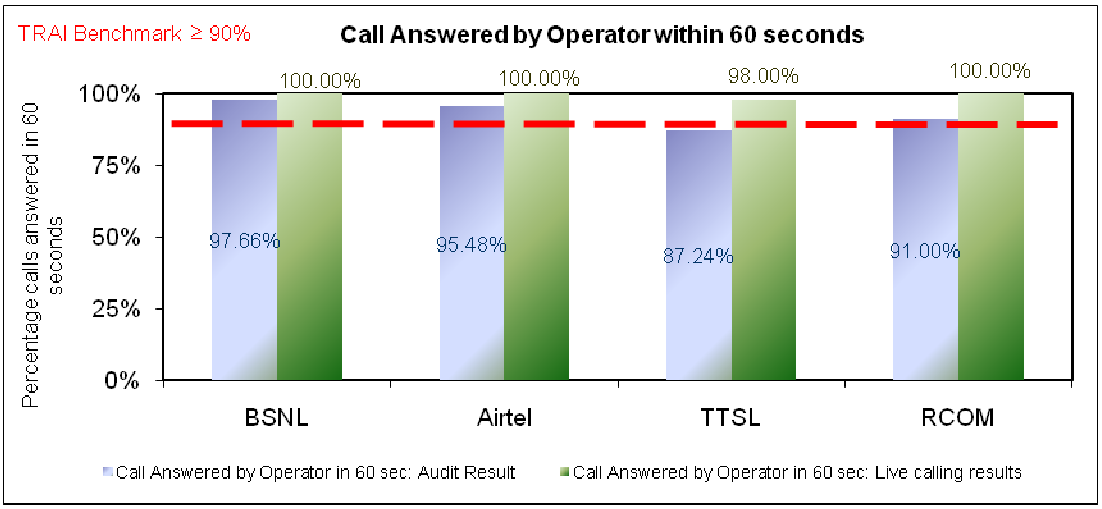
## Response time to customer for assistance - Calls answered and getting connected (Comparison between one month audit and live calling results)




**One month**
All operators are meeting the benchmark

**Live calling**
All operators are meeting the benchmark

**Response time to customer for assistance - Calls answered by the operator within 60 seconds (Comparison between one month audit results and live calling results)**




**One month**

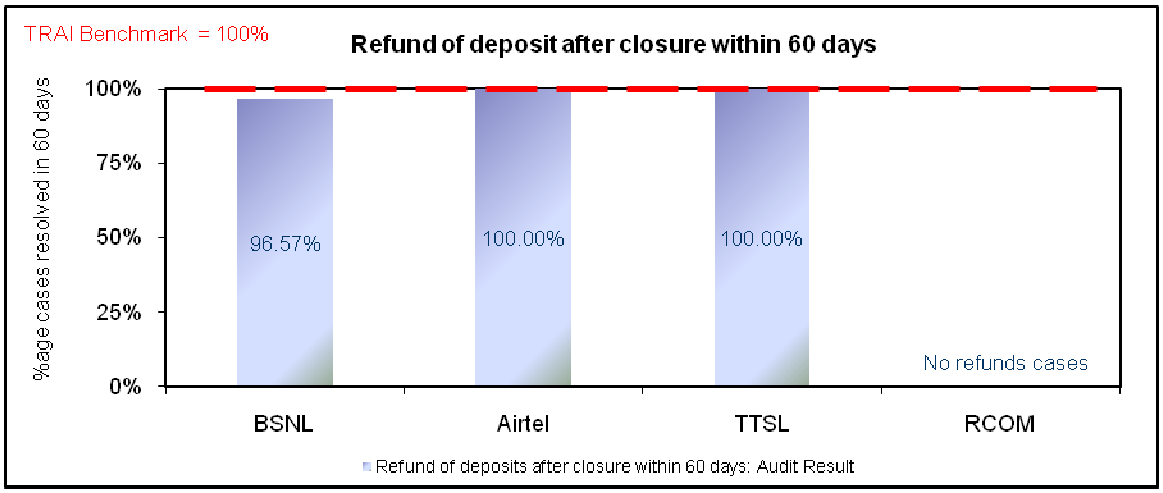
Operator meeting benchmark: BSNL, Airtel, RCOM

Operator not meeting benchmark: TTSL

**Live calling**

All operators are meeting the benchmark

**Time taken to refund of deposits after closure**




Operator meeting benchmark: Airtel, TTSL

Operator not meeting benchmark: BSNL

# 7.0 Compliance reports: Results of Verification of Records

## 7.1 Basic (Wireline) services

| Parameters | Benchmarks | BSNL* | | Airtel | | TTSL | | RCOM | |
|---|---|---|---|---|---|---|---|---|---|
| | | PMR | IMRB | PMR | IMRB | PMR | IMRB | PMR | IMRB |
| Faults incidences ( No. of faults/100 Subs./month) | ≤5 | 4.62 | 2.17 | 4.13 | 4.13 | 0.51 | 0.51 | 2.01 | 2.01 |
| % of faults repaired by next working day | By next working day: ≥ 90% | 82.49% | 93.61% | 97.87% | 97.87% | 75.31% | 75.31% | 100.00% | 100.00% |
| Total No. of faults registered during the quarter | | 297332 | 26043 | 13768 | 13768 | 1993 | 1993 | 5110 | 5110 |
| No. of faults repaired by next working day during the quarter | | 245125 | 24378 | 13479 | 13479 | 1501 | 1501 | 5110 | 5110 |
| No. of faults repaired within 3 days during the quarter | For urban areas | 238967 | 25590 | 13638 | 13638 | 1848 | 1848 | 5110 | 5110 |
| % of faults repaired within 3 days | For urban areas: ≥ 100% | 82.80% | 98.26% | 99.10% | 99.10% | 93.08% | 93.08% | 100.00% | 100.00% |
| No. of faults repaired within 5 days during the quarter | For rural and hilly areas | 57704 | 2599 | NA | NA | NA | NA | NA | NA |
| % of faults repaired within 5 days | For rural and hilly areas: | 98.80% | 99.54% | NA | NA | NA | NA | NA | NA |
| Rent Rebate : | ≥ 100% | | | | | | | | |
| Faults pending for> 3days and ≤7 days | Rent Rebate for 7 days | 0 | 14 | 50 | 50 | 114 | 114 | 0 | 2 |
| Faults pending for > 7 days and ≤15 days | Rent Rebate for 15 days | 0 | 0 | 27 | 27 | 23 | 23 | 2 | 0 |
| Faults pending for > 15 days | Rent Rebate for 30 days | 0 | 1201 | 4 | 4 | 8 | 8 | 0 | 0 |
| Mean Time to Repair (MTTR) | ≤ 8 Hrs | 13.97 | 6.39 | 5.47 | 5.47 | 13.48 | 13.48 | 2.29 | 2.29 |
| Call Completion Rate (CCR) | ≥ 55% | 67.58% | 70.73% | 87.85% | 87.85% | 98.51% | 98.51% | NA | NA |
| Total Number of successful local calls | | DNA | 2478353 | 4483183 | 4483183 | 8375322 | 8375322 | NA | NA |
| Total local call attempts | | DNA | 3504063 | 5103142 | 5103142 | 8502037 | 8502337 | NA | NA |
| Answer to Seizure Ratio (ASR) | ≥ 75 % | NA | NA | NA | NA | NA | NA | 90.14% | 90.14% |
| Total I/C seizures | | NA | NA | NA | NA | NA | NA | 3535822 | 3535822 |
| No. of answered calls | | NA | NA | NA | NA | NA | NA | 3187189 | 3187189 |
| Point of Interconnection (POI) Congestion (No. of PoIs not meeting benchmark) | ≤ 0.5% | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total number of working POI Service Area wise | | DNA | DNA | DNA | DNA | 64 | 283 | 15 | 15 |
| Metering and billing credibility - post paid | Not more than 0.1% | 0.06% | 0.06% | 0.00% | 0.00% | 0.01% | 0.02% | 0.03% | 0.03% |
| No. of bills issued during the period | | 4601911 | 314934 | 52871 | 52871 | 275493 | 275493 | 99535 | 99535 |
| No. of bills disputed including billing complaints during the period | | 874 | 185 | 0 | 0 | 48 | 48 | 33 | 33 |
| Metering and billing credibility - pre paid | Not more than 0.1% | NA | NA | NA | NA | NA | NA | NA | NA |
| No. of charging / credit / validity complaints during the quarter | | NA | NA | NA | NA | NA | NA | NA | NA |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Total no. of pre-paid customers at the end of the quarter | | NA | NA | NA | NA | NA | NA | NA | NA |
| Resolution of billing/ charging/ validity complaints | 100% within 4 weeks | 100.00% | 100.00% | 99.85% | 99.85% | 100.00% | 100.00% | 100.00% | 100.00% |
| No. of billing/(post paid) and charging, credit / validity (pre paid) complaints resolved within 4 weeks during the quarter | | DNA | 106 | 1324 | 1324 | 298 | 298 | 33 | 33 |
| Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter | | DNA | 106 | 1326 | 1326 | 298 | 298 | NA | 33 |
| No. of billing complaints (post paid) and charging, credit/validity complaints (pre paid) resolved in favor of the customer during the quarter | | 737 | 42 | 0 | 0 | 48 | 48 | 33 | 33 |
| No. of complaints disposed on account of not considered as valid complaints during the quarter | | 0 | 2 | 1326 | 1326 | 250 | 250 | 0 | 0 |
| Period of applying credit/ waiver/ adjustment to customer's account from the date of resolution of complaints | within 1 week of resolution of complaint | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Response time to the customer for assistance | ≥ 95% | 95.98% | 100.00% | 100.00% | 100.00% | 93.00% | 93.00% | 96.00% | 95.83% |
| Accessibility of call centre/ customer care | | DNA | 83622 | 394997 | 394997 | 742645 | 742645 | 460381 | 460381 |
| Total no. of call attempts to call centre / customer care nos. during TCBH | | DNA | 83622 | 394997 | 394997 | 798540 | 798540 | 480405 | 480405 |
| Percentage of calls answered by the operators (voice to voice) within 60 seconds | ≥ 90% | 90.39% | 98.66% | 98.50% | 98.50% | 76.82% | 76.82% | 92.00% | 92.00% |
| Termination / closure of service | ≤ 7 days | | | | | | | | |
| %age requests for Termination / Closure of service complied within 7 days | 100.00% | 88.70% | 99.18% | 100.00% | 100.00% | 85.93% | 85.93% | 100.00% | 100.00% |
| Total No. of requests for Termination / Closure of service received during the quarter | | 29329 | 2925 | 7515 | 7515 | 391 | 391 | 763 | 763 |
| No. of requests for Termination / Closure of service complied within 7 days during the quarter | | 26015 | 2901 | 7515 | 7515 | 336 | 336 | 763 | 763 |
| Time taken for refund of deposits after closures | 100% within 60 days. | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

* These have been calculated cumulatively on the basis of figures reported by various exchanges

Figures do not match with those reported in PMR  Not meeting the benchmark  Figures verified on all India bases

**B'mar**k = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

## 7.2 Conclusions

**Basic Wireline Services**

For verification of raw data for the period of July to September 2009, there was significant variation observed when compared to the figures reported in the PMR for BSNL

1. For variation observed in figures for BSNL is owing to the fact that only 5% of the total exchanges were audited for the operator whereas the data provided in the PMR is basis all the exchanges in the circle
2. All service providers except RCOM were found not to meeting benchmark for fault repair within 3 working days and MTTR

# Section B
# WIRELESS

# 8.0 Sampling methodology

### 8.1 Sampling for Cellular Mobile (Wireless) service providers

Data pertaining to 100% of the Gateway MSC's (GMSC's) and Mobile Switching Centers (MSC's) of all the Cellular Mobile Service Providers or Unified Access Service Providers (UASP) was collected and verified in specified circles/service areas. Following are the various operators covered in Andhra Pradesh circle.

| | Name of Operator | Month of Audit |
|---|---|---|
| Operator 1 | Airtel | January '10 |
| Operator 2 | Aircel | January '10 |
| Operator 3 | BSNL | February '10 |
| Operator 4 | Idea | January '10 |
| Operator 5 | RCOM CDMA | January '10 |
| Operator 6 | RCOM GSM | January '10 |
| Operator 7 | Tata CDMA | January '10 |
| Operator 8 | DoCoMo | January '10 |
| Operator 9 | Uninor | February '10 |
| Operator 10 | Vodafone | January '10 |

# 9.0 Audit methodology

## 9.1 Cellular Mobile Services

In a nutshell the following activities were done while auditing for various parameters for Cellular Mobile Services:

| S.no | Parameter | AS REPORTED IN PMR | AS FOUND IN ACTUAL RECORDS AFTER VERIFICATION | AS FOUND IN VERIFICATION FOR THE MONTH OF AUDIT | AS FOUND IN 3 DAY LIVE MEASUREMENT DATA | LIVE CALLING | OPERATOR ASSISSTED DRIVE TESTS | INDEPENDENT DRIVE TESTS |
|---|---|---|---|---|---|---|---|---|
| A | **Network Performance** | | | | | | | |
| A (i) | BTS accumulated down time | Yes | Yes | Yes | | | | |
| A (ii) | Call setup success rate (within licensee own network) | Yes | Yes | Yes | Yes | | Yes | Yes |
| A (iii) | Blocked Call Rate | Yes | Yes | Yes | Yes | | Yes | Yes |
| A (iv) | Call Drop rate | Yes | Yes | Yes | Yes | | Yes | Yes |
| A (v) | % Connections with good voice quality | Yes | Yes | Yes | | | Yes | Yes |
| A (vi) | Service Coverage | Yes | Yes | Yes | | | Yes | Yes |
| A (vii) | PoI Congestion | Yes | Yes | Yes | | | | |
| B | **Customer Helpline** | | | | | | | |
| B (i) | Response time to the customer for assistance | Yes | Yes | Yes | | Yes | | |
| C | **Billing Complaints** | | | | | | | |
| C (i) | Billing complaints per 100 bills issued | Yes | Yes | Yes | | | | |
| C (ii) | %age of billing complaints resolved within 4 weeks | Yes | Yes | Yes | | Yes | | |
| C (iii) | Period of all refunds/payments due to customers from date of resolution as in (ii) above | Yes | Yes | Yes | | Yes | | |

{Note: A more detailed explanation of parameter wise audit methodology for Cellular Mobile services is explained in Annexure II}

# 10.0 Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Cellular mobile service providers during the period starting from January 2010 to March 2010 in Andhra Pradesh circle. The executive summary encapsulates the key findings of the Audit by providing: -

- *"Service provider performance report"* for Cellular mobile service , which gives a glimpse of the performance of various operators against the benchmark specified by TRAI, during the month in which the Audit was carried out by IMRB Auditors

- *"Parameter wise critical findings"* for Cellular mobile services: This indicates key observations and findings from different activities carried out during the Audit process

## 10.1 Service provider performance report based on one month data verification: Cellular Mobile Services

| Name of Service Provider | Time Consistent Busy Hour (TCBH) | Network Availability | | | | | Connection Establishment (Accessibility) | | | Connection Maintenance (Retainability) | | | | | POI | | Network Traffic Capacity and Utilization | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total no. of BTSs in the licensed service area | Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month | BTSs Accumulated downtime (not available for service) (%age) | No. of BTSs having accumulated downtime of >24 hours in a month | Worst affected BTSs due to downtime (%age) | Call Set-up Success Rate (within licensee's own network) | SDCCH/ Paging Chl. Congestion (%age) | TCH Congestion (%age) | Call Drop Rate (%age) | Total No. of cells exceeding 3% TCH drop (call drop) | Total no. of cells in the network | Worst affected cells having more than 3% TCH drop (call drop) rate (%age) | %age of connection with good voice quality | POI Congestion (No. of POIs not meeting the benchmark)) | Total number of working POI Service Area wise | Equipped Capacity of Network in respect of Traffic in erlang | Total traffic handled in TCBH in erlang | Total no. of customers served (as per VLR) on last day of the month |
| Benchmark | | | | ≤ 2% | | ≤ 2% | ≥ 95% | ≤ 1% | ≤ 2% | ≤ 2% | | | ≤ 5% | ≥ 95% | ≤ 0.5% | | | | |
| **Airtel** | 19:00 - 20:00 | 8954 | 1819 | 0.03% | 29 | 0.32% | 99.02% | 0.36% | 0.58% | 0.72% | 721 | 25367 | 2.84% | 99.04% | 0 | 45 | 546350 | 440900 | 11865265 |
| **Aircel** | 20:00 - 21:00 | 2219 | 830 | 0.05% | 0 | 0.00% | 99.32% | 0.02% | 0.03% | 0.40% | 281 | 6790 | 4.14% | 97.80% | 2 | 45 | 58210 | 9271 | 597400 |
| **BSNL** | 19:00 - 20:00 | 3540 | 12534 | 0.48% | 23 | 0.65% | 95.20% | 0.45% | 1.06% | 1.59% | 538 | 9162 | 5.87% | 98.00% | 0 | 16 | 152000 | 94715 | 3048356 |
| **Idea** | 20:00 - 21:00 | 5906 | 419 | 0.01% | 0 | 0.00% | 99.88% | 0.42% | 0.45% | 0.63% | 655 | 17523 | 3.74% | 96.32% | 0 | 177 | 225803 | 162502 | 5540736 |
| **RCOM CDMA** | 19:00 - 20:00 | 2415 | 3107 | 0.17% | 8 | 0.33% | 99.43% | 0.00% | 0.09% | 0.96% | 60 | 2415 | 2.48% | 99.22% | 7 | 154 | 316000 | 105029 | 3405011 |
| **RCOM GSM** | 19:00 - 20:00 | 3053 | 4978 | 0.22% | 9 | 0.29% | 99.03% | 0.04% | 0.06% | 0.60% | 150 | 9159 | 1.64% | 98.95% | 7 | 154 | DNP | DNP | DNP |
| **Tata CDMA** | 19:00 - 20:00 | 1200 | 174 | 0.02% | 0 | 0.00% | 98.78% | 0.45% | 3.00% | 0.45% | 25 | 1200 | 2.08% | 97.90% | 5 | 283 | 217772 | 74230 | 2065908 |
| **DoCoMo** | 19:00 - 20:00 | 2884 | 4444 | 0.21% | 20 | 0.69% | 99.05% | 0.92% | 0.62% | 1.11% | 764 | 8216 | 9.30% | 95.82% | 0 | 3 | 145000 | 65092 | 2060970 |
| **Uninor** | 19:00 - 20:00 | 1561 | 924 | 0.08% | 3 | 0.19% | 99.23% | 0.03% | 0.02% | 0.25% | 5106 | 144515 | 3.53% | 99.11% | 3 | 40 | 44000 | 2782 | 117080 |
| **Vodafone** | 19:00 - 20:00 | 7441 | 1830 | 0.03% | 1 | 0.01% | 99.23% | 0.19% | 0.38% | 0.55% | 750 | 22282 | 3.37% | 98.65% | 0 | 49 | 141350 | 102202 | 3132855 |

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

**B'mark** = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

**Critical findings: Cellular Mobile Services**

The audit for cellular mobile service providers were conducted at their respective MSCs in the Andhra Pradesh circle except for Reliance Communication wherein the audit was conducted at their central NOC at Mumbai.

The audit involved a three stage verification process which consisted of auditing the records of the service providers and verifying the data submitted to TRAI. The second step involved a three day live measurement of all the network parameters. Finally basis the three day live measurement the auditors needed to find out the busy hour for the service provider and collect the hourly data for this busy hour for the month in which the audit was conducted.

**Busy Hour of Various Service Providers**

| Service Provider | Reported Time Consistent Busy Hour | Network Busy Hour found in 3 day live measurement |
|---|---|---|
| **Airtel** | 19:00 - 20:00 | 19:00 - 20:00 |
| **Aircel** | 20:00 - 21:00 | 20:00 - 21:00 |
| **BSNL** | 19:00 - 20:00 | 19:00 - 20:00 |
| **Idea** | 20:00 - 21:00 | 20:00 - 21:00 |
| **RCOM CDMA** | 19:00 - 20:00 | 19:00 - 20:00 |
| **RCOM GSM** | 19:00 - 20:00 | 19:00 - 20:00 |
| **Tata CDMA** | 19:00 - 20:00 | 19:00 - 20:00 |
| **DoCoMo** | 19:00 - 20:00 | 19:00 - 20:00 |
| **Uninor** | 19:00 - 20:00 | 19:00 - 20:00 |
| **Vodafone** | 19:00 - 20:00 | 19:00 - 20:00 |

The TCBH reported by all the service providers matched the network busy hour calculated by IMRB auditors for the Andhra Pradesh circle.

*BTSs Accumulated Downtime & Worst affected BTSs*
In the Andhra Pradesh circle, all the operators were found to be meeting the TRAI benchmark for this parameter. Tata experienced the lowest outage hours (around 174 hrs) in the month of audit. All the operators were found to be meeting the TRAI benchmark for worst affected BTSs due to downtime.

*Call Set-up Success Rate (CSSR):*
All the operators were comfortably meeting the benchmark on this parameter. During the audits the maximum CSSR was observed for Idea with 99.88% of their calls getting completed. All the operators were found to be calculating the parameter as per the norm specified by TRAI. CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

*Network Congestion parameters:*
SDCCH / Paging Channel Congestion, TCH and POI are part of the network congestion parameters. All the operators except Tata CDMA for Traffic channel congestion are meeting the TRAI specified benchmarks on the congestion parameters. Tata CDMA does not meet the TRAI specified benchmark with a Traffic Channel congestion of 3.00% which was found during the one month data collected for the month of audit. The calculation methodology of these parameters was found to be in accordance with what has been specified by TRAI. Both RCOM CDMA and Tata Teleservices measure paging channel utilization. When the value of this parameter is less than 100%, it is counted as 0% congestion. POIs for Aircel, RCOM, Tata CDMA and Uninor were found with congestion more than the TRAI benchmark (≤0.5%).

*Call Drop Rate:*

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators. All service providers were found to be meeting the TRAI specified benchmark. The lowest call drop rate was of Uninor at 0.25% while the highest was for BSNL at 1.59%.

BSNL (5.87%) and DoCoMo (9.30%) do not meet the TRAI benchmark for worst affected cells having more than 3% TCH drop.

*Connections with good voice quality:*

All the operators are measuring this parameter via their periodic drive tests. However, for some operators these parameters can be obtained at their switch as well. During the audit it was found that all the service providers were meeting TRAI benchmark for this parameter.

*Customer Care / Helpline Assessment*

For the accessibility of customer care aspect all the service providers meet the TRAI benchmark. Tata DoCoMo, RCOM CDMA & GSM are not meeting benchmark for percentage calls answered within 60 seconds for the month of audit.

*Billing performance*

All operators except BSNL (0.16%) and Uninor (0.22%) were found to be meeting the benchmark of ≤ 0.1% complaints registered per 100 bills issued. Aircel and Tata CDMA are not meeting benchmark of 100% billing complaints being resolved within 4 weeks. In all cases where customers were due for refund, all the service providers except Uninor meet the TRAI benchmark of 100% with 1 week.

*Inter operator calls assessment*

| Inter operator call Assessment To ↓ From → | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|
| Airtel | NA | 100% | 98% | 100% | 100% | 99% | 99% | 99% | 99% | 100% |
| Aircel | 100% | NA | 98% | 99% | 100% | 99% | 99% | 100% | 100% | 100% |
| BSNL | 100% | 100% | NA | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Idea | 100% | 100% | 100% | NA | 100% | 100% | 100% | 100% | 100% | 100% |
| RCOM CDMA | 100% | 97% | 100% | 100% | NA | 100% | 98% | 100% | 99% | 100% |
| RCOM GSM | 100% | 99% | 100% | 100% | 100% | NA | 97% | 100% | 100% | 100% |
| Tata CDMA | 100% | 100% | 100% | 100% | 100% | 100% | NA | 99% | 100% | 100% |
| DoCoMo | 100% | 99% | 97% | 100% | 100% | 99% | 96% | NA | 99% | 100% |
| Uninor | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | NA | 100% |
| Vodafone | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | NA |

The maximum problem faced by the calling operator to other operators

In the inter-operator call assessment, calls were made from the test SIMs of service provider whose audit was being conducted to all the other service providers. BSNL, RCOM GSM and Tata CDMA found tough connecting to a DoCoMo number. Aircel had difficulty in connecting to a RCOM CDMA number with 97% of their calls getting completed.

*Results of Operator assisted Drive test*

The drive test was conducted simultaneously for all the operators present in the Andhra Pradesh circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Hyderabad, Guntur and Vizag. IMRB auditors were present in vehicles of every operator. A sample of 15 – 30 test calls were made along each of the routes. The holding period for all test calls was between 120 seconds to 180 seconds. The drive test vehicle across all routes plied at a speed of less than 20 km per hour. Taking into consideration the route that was taken for the drive test; most of the major areas Andhra Pradesh telecom circles were covered.

For measuring voice quality RxQual samples for GSM operators and Frame Error Rate (FERs) for CDMA service providers were measured. RxQual greater than 5 meant that the sample was not of appropriate voice quality and for CDMA operators FERs of more than 4 were considered bad. Call drops were measured by the number of calls that were dropped to the total number of calls established during the drive test. Similarly CSSR was measured as the ratio of total calls established to the total call attempts made. Signal strength was measured in Dbm with strength > -75dbm for indoor, -85 dbm for in-vehicle and > -95 dbm outdoor routes.

The drive tests in the Andhra Pradesh circle were conducted in the cities of Hyderabad, Guntur and Vizag was conducted along the following route:

| | Type of location | Hyderabad | Guntur | Vizag |
|---|---|---|---|---|
| **Outdoor** | Peiphery of the city | Madeenaguda – Chandanagar-Lingampally-HCU-Gachibowli-Tolichowki | Auto nagar-Municipal office-Darga road-Chuttugunta-Mirchiyard-HB colony-Pattapuram-Koritepadu | Gajuvaka- Auto nagar-NAD-Birla junction-Muralinagar-Seethammadhara-Isukathota-Vishalakshi nagar-LB colony-beach road |
| | Congested area | Seethaphalmandi-Adikmet-Vidyanagar-Shivam-Thilaknagar-VST-Bhaglingampally-narayanaguda-Liberty-MLA Quarters-Kachiguda-Badichowdi-Chadarghat | Arandal peta 16 lines-Brodipeta | Complex- diamond circle-seethampeta-Rama talkies- Jagadamba junction-Purna Market-Gnanapuram-Kancharapalem-Urvasi-104 Area-NAD X road |
| | Across the city | Tolichowki-Mahadipatnam-Banjarahills-Pajagutta-Begumpet-Lower tankbund-RTC X Road-Chilakalaguda | Municipal office-Arandalpeta main road-Laxmipuram-Brundavan garden-RTO office-Municipal office | Old post office- convent junction-Thatichetla palem-Akkayyapalem-Gurudvar-Maddelapalem-MVP-Ushodaya junction-China valthelru-Siripuram junction-complex |
| **Indoor** | Office complex | GVK One, Banjarahills | Raghu Mnasion, Brodipeta-2 | GK Towers, Dvaraka nagar, |
| | Shopping complex | DOC Sadan, Abids | Vasundhara complex, Kothapeta, Near Zinna towers | VRC complex, complex |

The tables given below gives a glimpse of the results of the operator assisted drive test:

### *Drive Test – Hyderabad*

| | Benchmark | Airtel | | Aircel | | BSNL | | Idea | | RCOM CDMA | | RCOM GSM | | Tata CDMA | | DoCoMo | | Uninor | | Vodafone | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor |
| Voice quality | ≥ 95% | 99.48% | 96.95% | 98.80% | 96.62% | 98.60% | 96.86% | 99.30% | 97.81% | 100.00% | 99.68% | 99.94% | 94.78% | 99.86% | 99.06% | 99.46% | 92.10% | 99.60% | 98.42% | 99.24% | 97.77% |
| CSSR | ≥ 95% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 93.33% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 96.83% | 100.00% | 100.00% | 100.00% | 100.00% |
| %age Blocked calls | | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 6.67% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 3.17% | 0.00% | 0.00% | 0.00% | 0.00% |
| Call drop rate | ≤ 2% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.89% | 0.00% | 0.00% | 0.00% | 0.63% | 0.00% | 1.69% | 0.00% | 0.00% | 0.00% | 3.17% | 0.00% | 0.00% | 0.00% | 0.00% |
| Hands off success rate | | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

### *Drive Test – Guntur*

| | Benchmark | Airtel | | Aircel | | BSNL | | Idea | | RCOM CDMA | | RCOM GSM | | Tata CDMA | | DoCoMo | | Uninor | | Vodafone | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor |
| Voice quality | ≥ 95% | 98.55% | 98.05% | 99.56% | 98.02% | 98.70% | 95.43% | 97.73% | 98.54% | 100.00% | 99.99% | 99.48% | 98.61% | 100.00% | 99.72% | 98.57% | 92.81% | 99.40% | 98.41% | 98.79% | 97.01% |
| CSSR | ≥ 95% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 97.75% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 96.97% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |
| %age Blocked calls | | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 2.25% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 3.03% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Call drop rate | ≤ 2% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 1.83% | 0.00% | 0.00% | 0.00% | 0.00% |
| Hands off success rate | | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

### *Drive Test – Vizag*

| | Benchmark | Airtel | | Aircel | | BSNL | | Idea | | RCOM CDMA | | RCOM GSM | | Tata CDMA | | DoCoMo | | Uninor | | Vodafone | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor | In door | Outdoor |
| Voice quality | ≥ 95% | 99.70% | 97.61% | 99.67% | 96.09% | 98.40% | 95.31% | 99.75% | 97.69% | 99.97% | 99.03% | 99.82% | 93.06% | 100.00% | 98.98% | 97.53% | 93.30% | 99.58% | 97.22% | 97.54% | 98.93% |
| CSSR | ≥ 95% | 100.00% | 100.00% | 100.00% | 100.00% | 81.08% | 66.47% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 92.72% | 100.00% | 100.00% | 100.00% | 99.21% | 100.00% | 100.00% | 100.00% | 100.00% |
| %age Blocked calls | | 0.00% | 0.00% | 0.00% | 0.00% | 18.92% | 33.53% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 7.28% | 0.00% | 0.00% | 0.00% | 0.79% | 0.00% | 0.00% | 0.00% | 0.00% |
| Call drop rate | ≤ 2% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 13.27% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 4.29% | 0.00% | 0.00% | 0.00% | 1.61% | 0.00% | 0.00% | 0.00% | 0.00% |
| Hands off success rate | | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 98.39% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 98.06% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

Not meeting the benchmark

Following were the areas where the signal strength was found to be inadequate for the operators:

Hyderabad: There was interference and low signal strength recorded for operators in the outdoor areas near Indira Nagar, Sarilingampally, Lingampally railway crossing, Seethphalmandi, Lalbunglow Ameerpet, Telecom Nagar, Padmarao Nagar, Ambarnagar Warasiguda, Rethi Bowli, Green Lands, Andhra Mahila Sabha, Domalguda, Vidyanagar, Tilaknagar, Bashirbaugh Flyover and Taj Krishna, Shoppers stop while in the indoor areas inadequate coverage was not found in any of the areas.

Guntur: There was interference and low signal strength recorded for operators in the outdoor areas of Kannavarothota over bridge, Janakiram complex, Pattabhipuram 4th lane, MRF show room Arundathi nagar, M&M showroom, Garden Centre, Old Pathibhipuram, Laxmipuram Main Road, NH-5 Y-Junction, Autonagar and Mirchiyard, Chilakaluripeta bypass road and RTO office - Kankaragunta new flyover bridge while in the indoor areas there was no inadequate coverage or interference recorded.

Vizag: There was interference and low signal strength recorded for all operators in the outdoor areas of Kailashpuram, Nindi junction, Doctors colony, Gokul theater road, New Murali Nagar, Rushi Konda, Kailash giri, Open lands (Port Area - Near Airport), NGGOs colony, Narismhanagar, Port stadium, Visalakshinagar, LB Colony, Coastal Battery, Fishing Harbour, Convent Junction, Thatichetlapalem, Ushodaya Junction, Seven hills hospital while in the indoor areas no interference and inadequate coverage was recorded.

**Conclusions:**

3 Drive tests were conducted by IMRB with the help of service providers to measure voice quality, CSSR and call drop rate parameters.

1. RCOM GSM in Hyderabad and Vizag and DoCoMo in all 3 cities does not meet the TRAI benchmark on voice quality in outdoor areas
2. BSNL in Hyderabad and Vizag while RCOM GSM in Vizag do not meet the benchmark for CSSR in outdoor as well as indoor areas
3. DoCoMo in Hyderabad and BSNL & RCOM GSM in Vizag do not meet the TRAI benchmark on call drop rate in Andhra Pradesh circle

## Summary of Live Measurement Results – Cellular Mobile Services

| Name of Service Provider | Connection Establishment (Accessibility) | | | Connection Maintenance (Retainability) | | | Metering and Billing | Response time to customer for assistance | |
|---|---|---|---|---|---|---|---|---|---|
| | Call Set-up Success Rate (within licensee's own network) | SDCCH/ Paging Chl. Congestion (%age) | TCH Congestion (%age) | Call Drop Rate (%age) | Worst affected cells having more than 3% TCH drop | %age of connection with good voice quality* | %age complaints resolved within 4 weeks | Accessibility of call centre/ customer care | Percentage of calls answered by the operators (voice to voice) within 60 seconds |
| **Benchmark** | **≥ 95%** | **≤ 1%** | **≤ 2%** | **≤ 2%** | **≤ 5%** | **≥ 95%** | **100%** | **≥ 95%** | **≥ 90%** |
| **Airtel** | 99.03% | 0.33% | 0.52% | 0.63% | 2.86% | 97.90% | 100.00% | 100.00% | 99.00% |
| **Aircel** | 99.51% | 0.01% | 0.04% | 0.38% | 3.47% | 97.43% | 92.00% | 100.00% | 100.00% |
| **BSNL** | 96.00% | 0.74% | 1.94% | 1.86% | 4.95% | 96.49% | 100.00% | 100.00% | 75.00% |
| **Idea** | 99.85% | 0.98% | 1.49% | 0.65% | 3.81% | 98.20% | 84.00% | 100.00% | 100.00% |
| **RCOM CDMA** | 99.35% | 0.00% | 0.14% | 0.77% | 1.40% | 99.65% | 96.15% | 95.00% | 95.00% |
| **RCOM GSM** | 98.90% | 0.04% | 0.20% | 0.65% | 1.42% | 96.17% | 98.00% | 100.00% | 98.00% |
| **Tata CDMA** | 98.72% | 0.38% | 2.00% | 0.43% | 1.91% | 99.30% | 53.00% | 90.00% | 85.00% |
| **DoCoMo** | 98.08% | 0.39% | 0.47% | 0.95% | 7.55% | 94.15% | 84.00% | 100.00% | 92.00% |
| **Uninor** | 99.43% | 0.11% | 0.04% | 0.27% | 3.20% | 98.38% | 95.00% | 100.00% | 97.00% |
| **Vodafone** | 99.10% | 0.18% | 0.54% | 0.55% | 4.38% | 97.98% | 93.00% | 100.00% | 99.00% |

Not meeting the benchmark

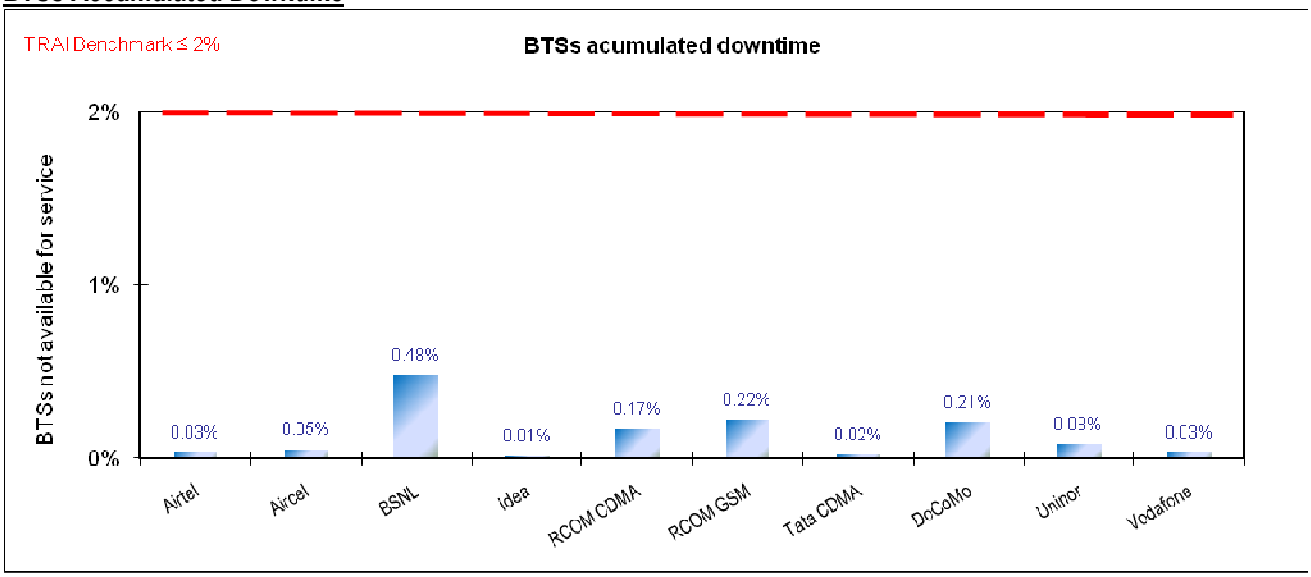
* Based on operator assisted drive tests conducted by IMRB

During the three day live measurement, all operators except DoCoMo for worst affected cells and voice quality are meeting Connection Establishment and Connection Maintenance benchmark. None of the operator except Airtel and BSNL was found to be meeting benchmark for %age complaints resolved within 4 weeks during live calling. Tata CDMA falls short of benchmark for Accessibility of call centre while both Tata CDMA and BSNL do not meet TRAI benchmark for Percentage of calls answered by the operators within 60 seconds during live calling.

# 11.0 Detailed findings – Includes comparison between Live calling/Live measurements and One month data collection

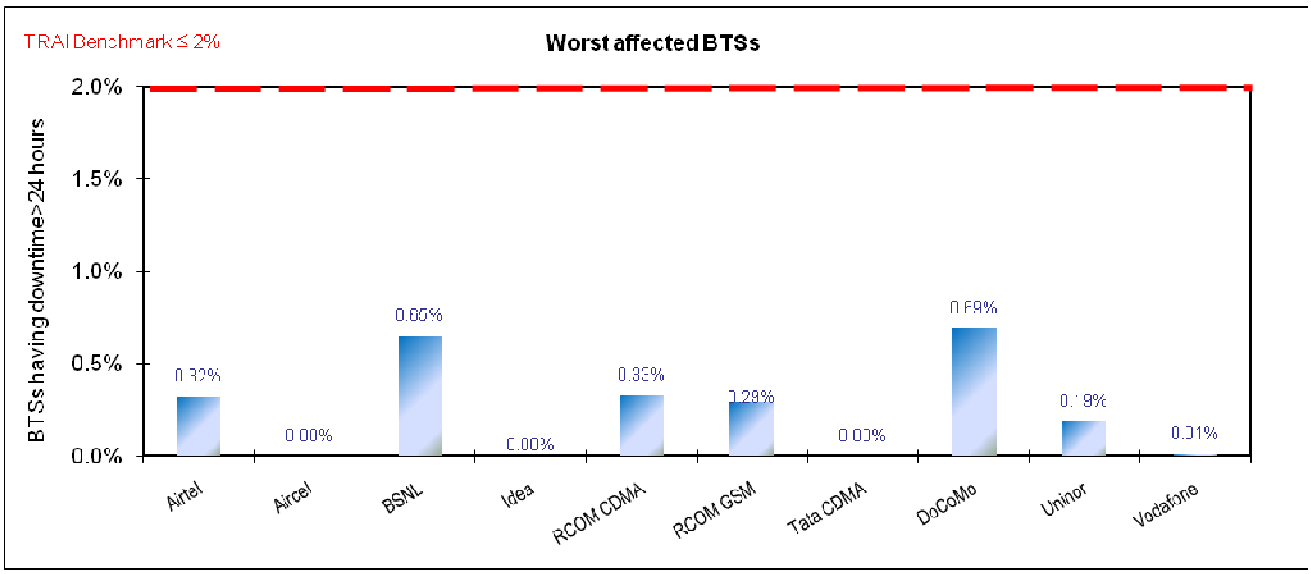
## 11.1 Graphical/Tabular Representations for Cellular Mobile Services

### BTSs Accumulated Downtime



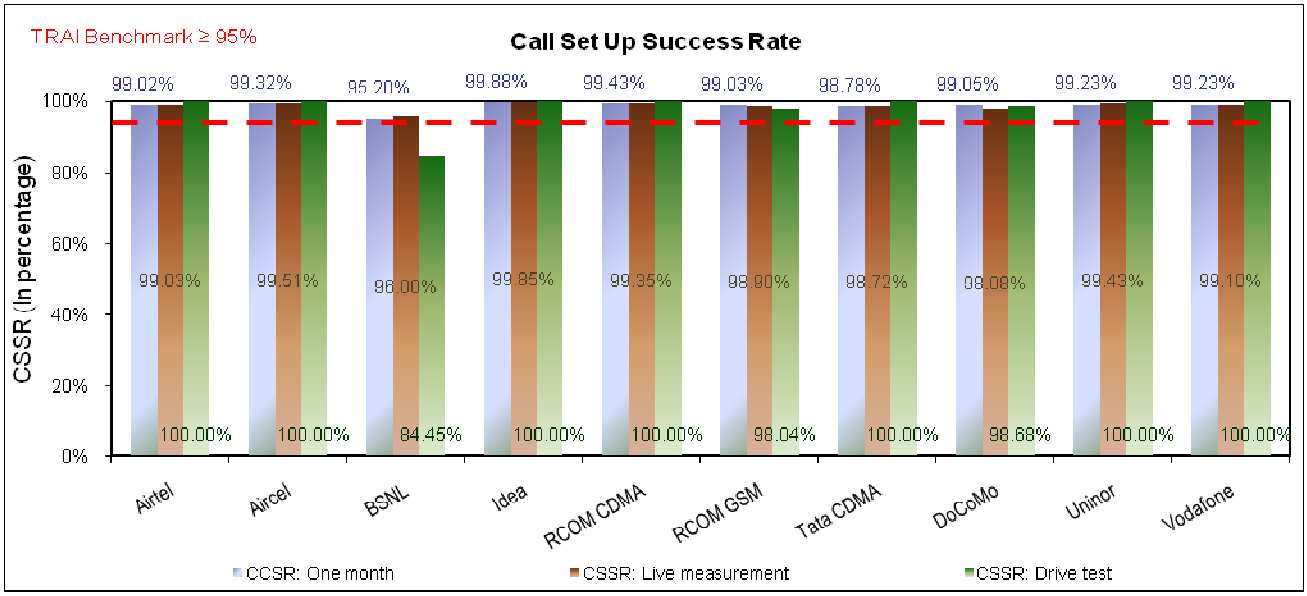

All the operators meet the benchmark

### Worst Affected BTSs




All the operators meet the benchmark

## Call Set-up Success Rate (CSSR)

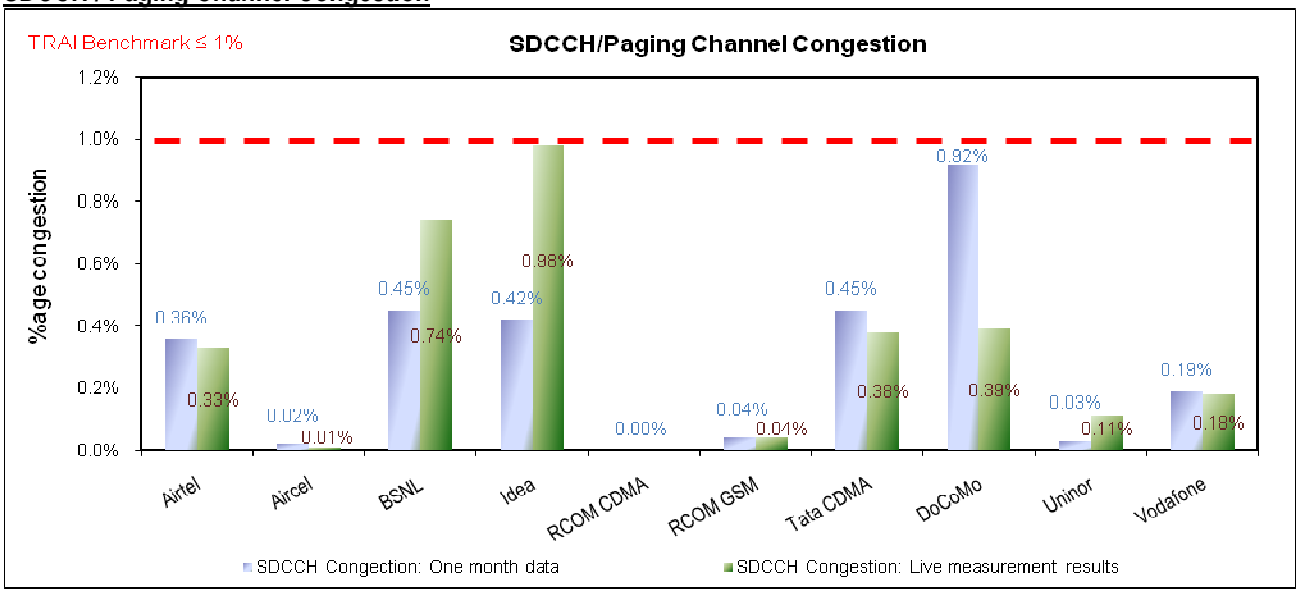



**One month**
All the operators meet the benchmark

**Live measurement**
All the operators meet the benchmark

**Drive test**
Operator(s) meeting benchmark: Airtel, Aircel, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, DoCoMo, Uninor, Vodafone
Operator(s) not meeting the benchmark: BSNL

## SDCCH / Paging Channel Congestion



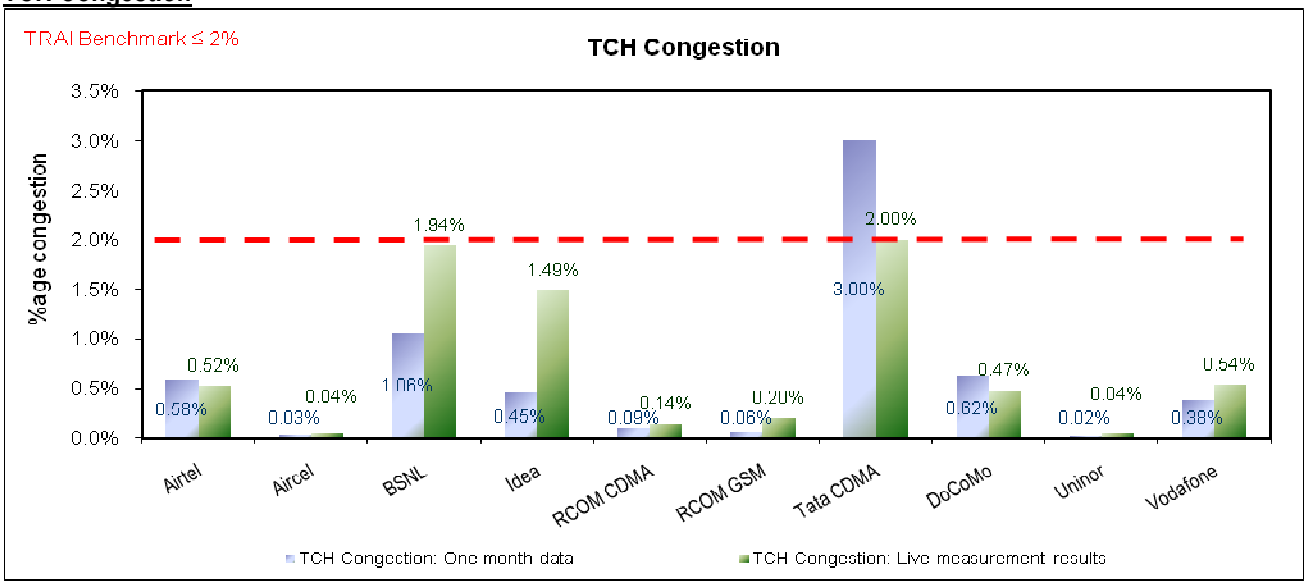
**One month**

All the operators meet the benchmark

**Live measurement**

All the operators meet the benchmark

**TCH Congestion**




**One month**

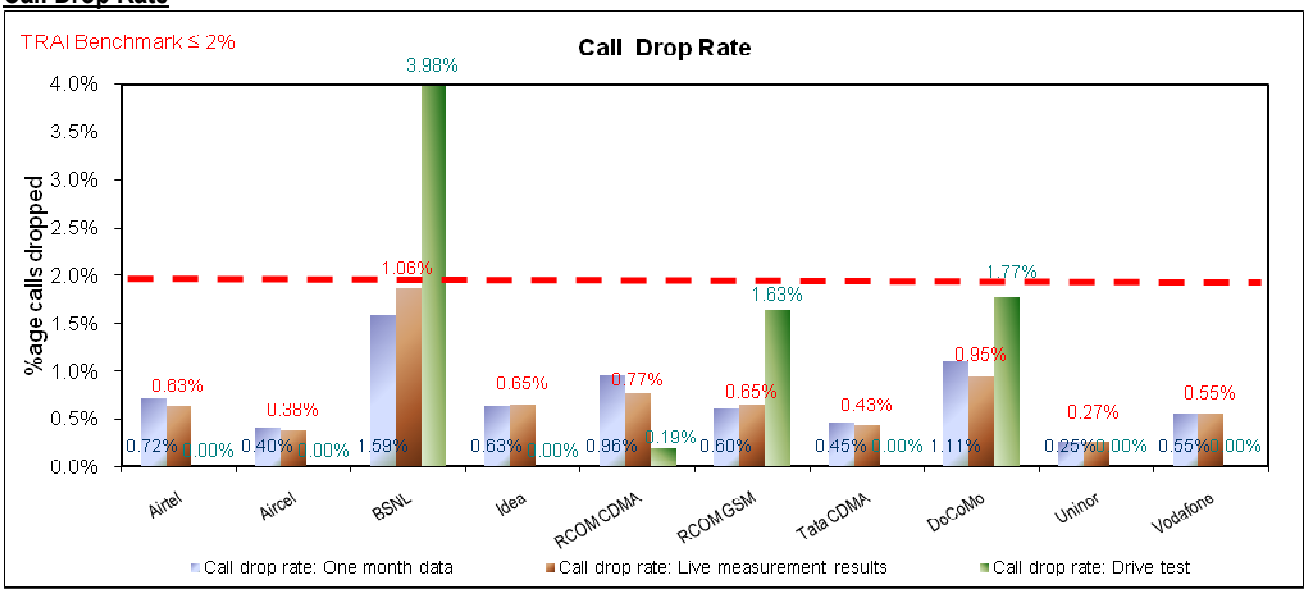
Operator(s) meeting benchmark: Airtel, Aircel, BSNL, Idea, RCOM CDMA, RCOM GSM, DoCoMo, Uninor, Vodafone

Operator(s) not meeting the benchmark: Tata CDMA

**Live measurement**

All the operators meet the benchmark

**Call Drop Rate**

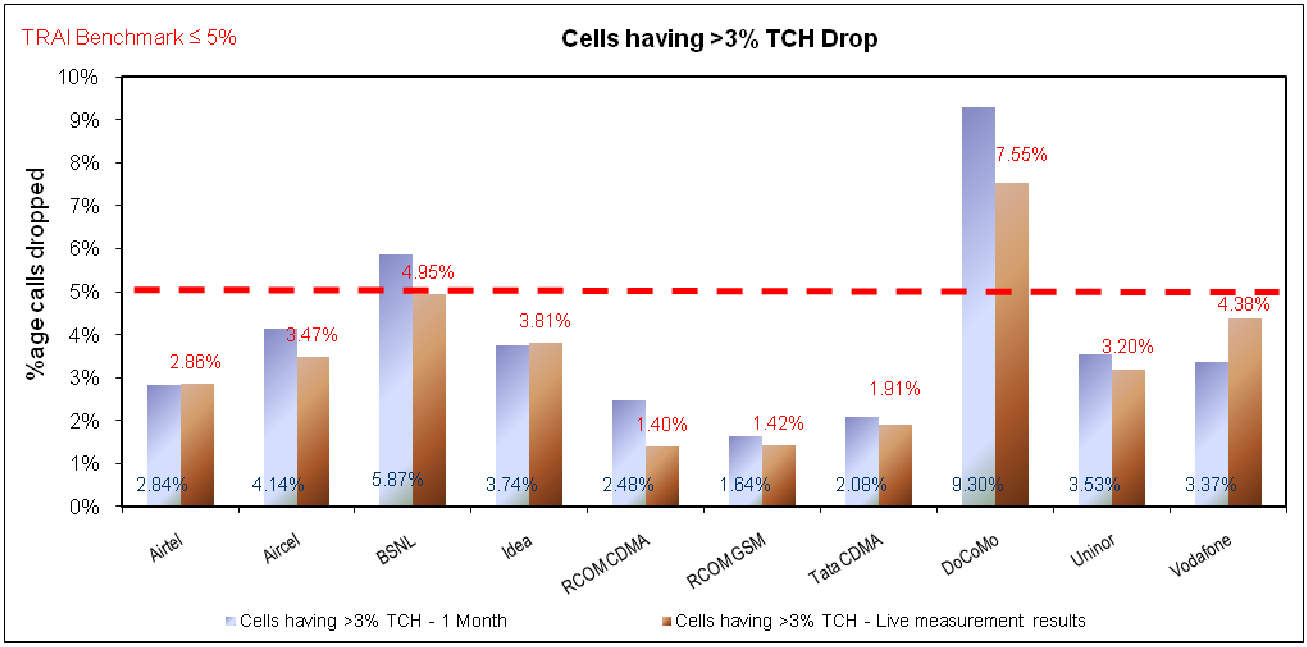


**One month**
All the operators meet the benchmark

**Live measurement**
All the operators meet the benchmark

**Drive test**
Operator(s) meeting benchmark: Airtel, Aircel, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, DoCoMo, Uninor, Vodafone
Operator(s) not meeting the benchmark: BSNL

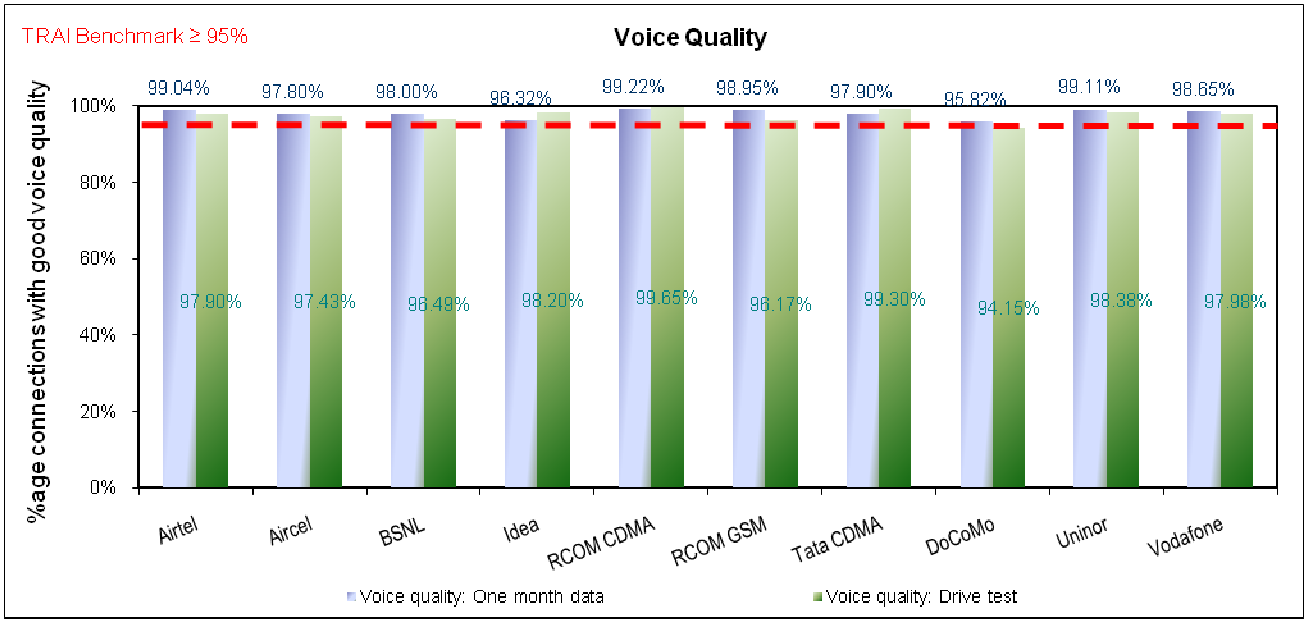
**Cells with more than 3% Call Drop Rate**




**One month**
Operator(s) meeting benchmark: Airtel, Aircel, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, Uninor, Vodafone
Operator(s) not meeting the benchmark: BSNL, DoCoMo

**Live measurement**
Operator(s) meeting benchmark: Airtel, Aircel, BSNL, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, Uninor, Vodafone
Operator(s) not meeting the benchmark: DoCoMo

## Voice quality




**One month**

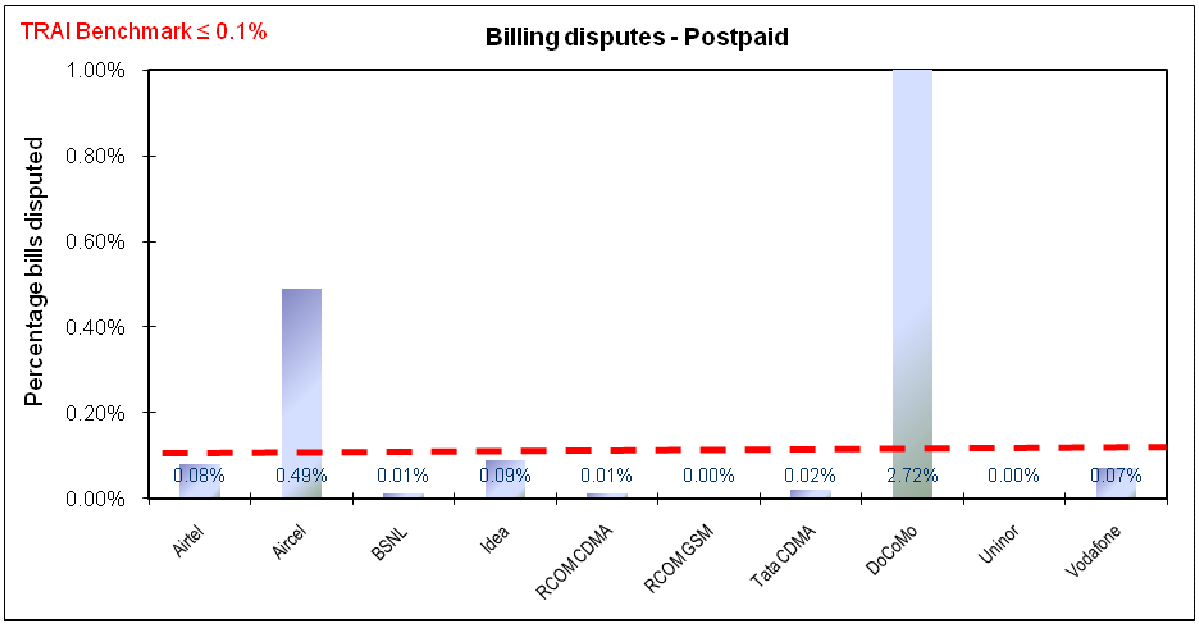
All the operators meet the benchmark

**Live measurement (Drive test)**

Operator(s) meeting benchmark: Airtel, Aircel, BSNL, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, Uninor, Vodafone

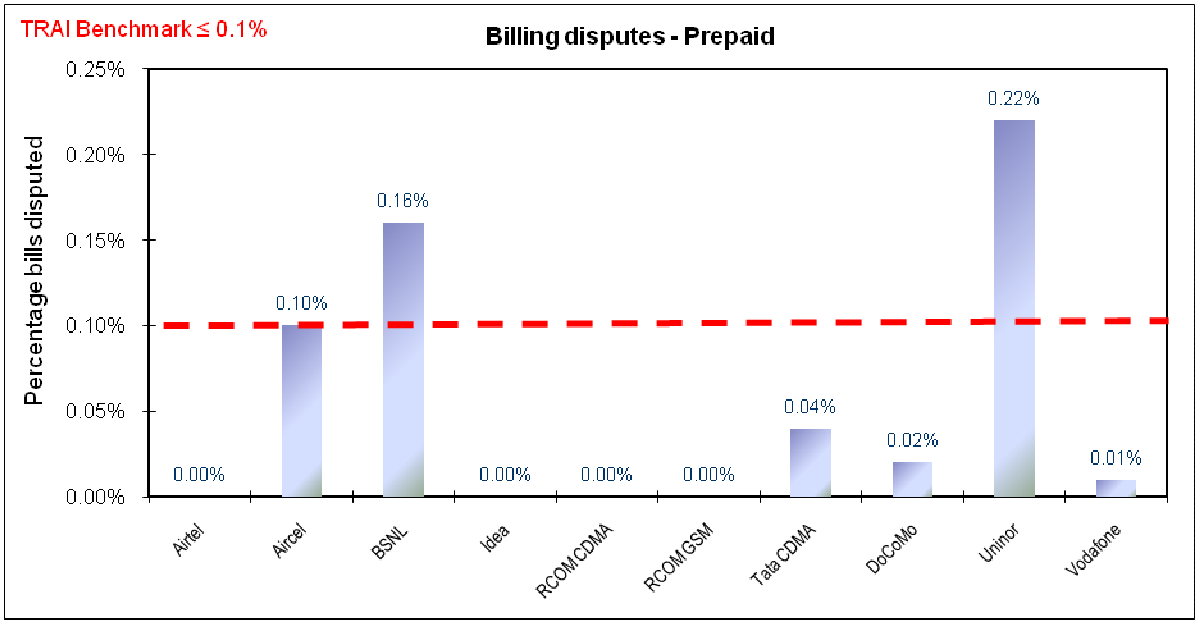
Operator(s) not meeting the benchmark: DoCoMo

## Billing Disputes - Postpaid



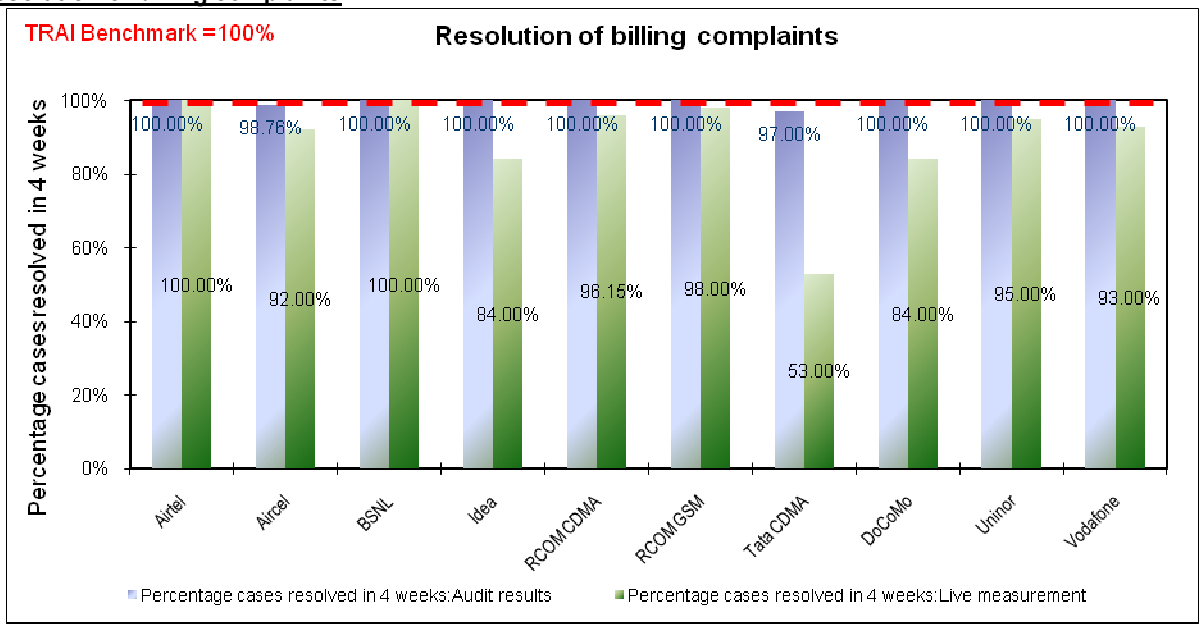
Operator(s) meeting benchmark: Airtel, BSNL, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, Vodafone
Operator(s) not meeting the benchmark: Aircel, DoCoMo

**Complaints - Prepaid**




Operator(s) meeting benchmark: Airtel, Aircel, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, DoCoMo, Vodafone
Operator(s) not meeting the benchmark: BSNL, Uninor

**Resolution of billing complaints**




**One month**

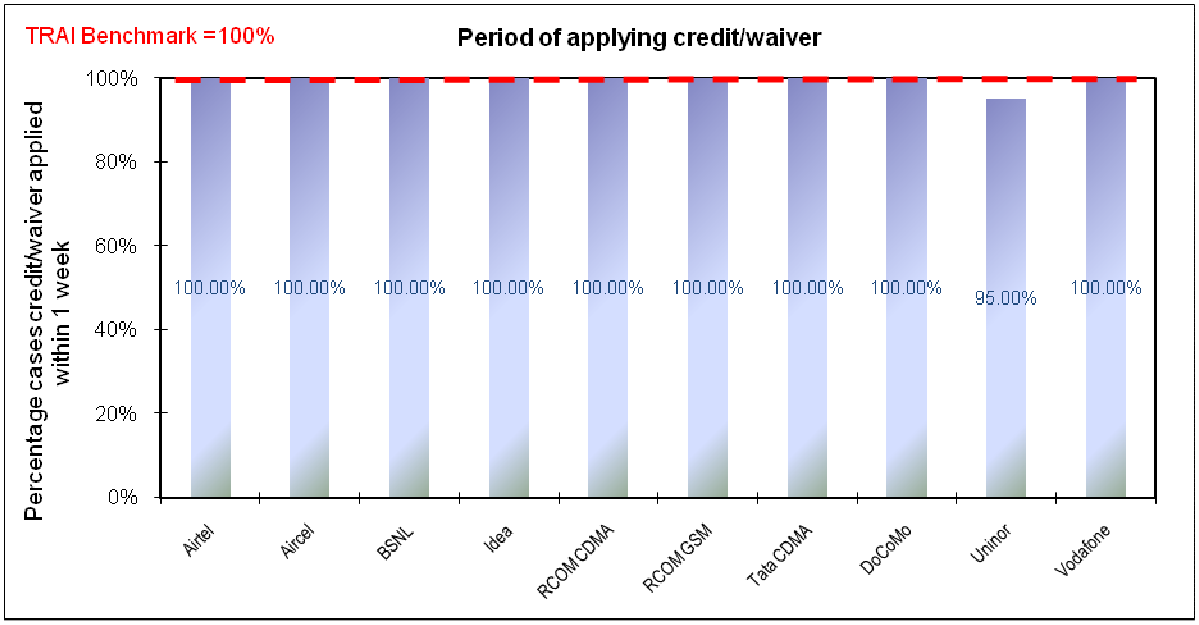
Operator(s) meeting benchmark: Airtel, BSNL, Idea, RCOM CDMA, RCOM GSM, DoCoMo, Uninor, Vodafone
Operator(s) not meeting the benchmark: Aircel, Tata CDMA

**Live measurement**

Operator(s) meeting benchmark: Airtel, BSNL

Operator(s) not meeting the benchmark: Aircel, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, DoCoMo, Uninor, Vodafone

## Period of applying credit / waiver



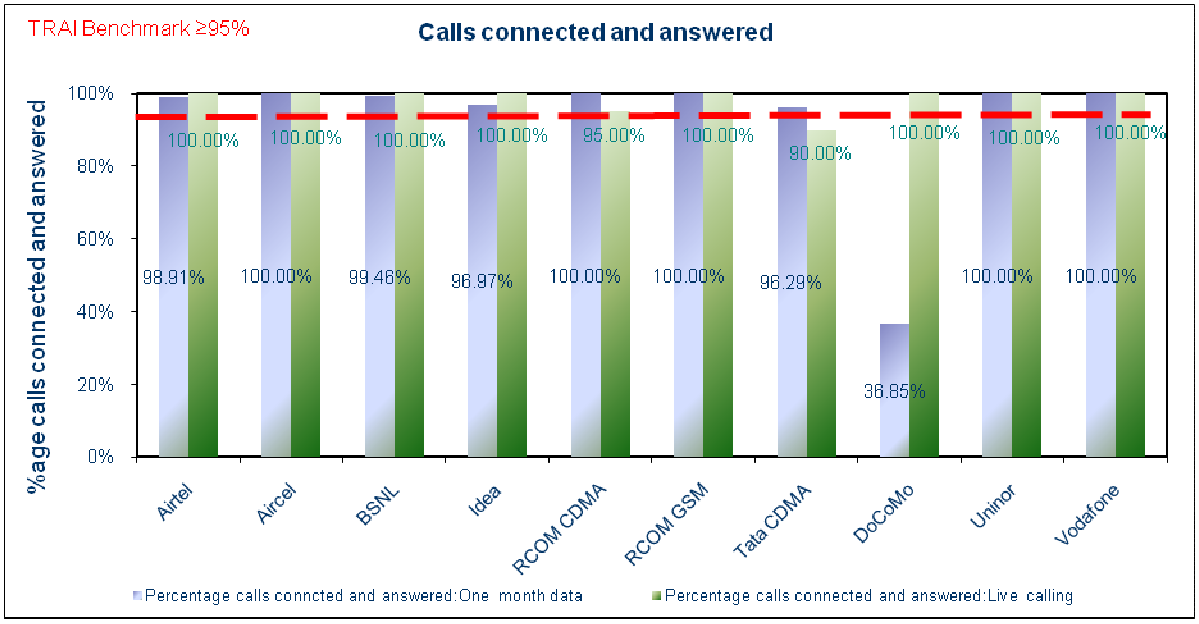

Operator(s) meeting benchmark: Airtel, Aircel, BSNL, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, DoCoMo, Vodafone

Operator(s) not meeting the benchmark: Uninor

## Live calling for billing Complaints

| Resolution of billing complaints | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Number of calls made | | 100 | 100 | 7 | 100 | 52 | 100 | 100 | 50 | 100 | 100 |
| Number of cases resolved in 4 weeks | | 100 | 92 | 7 | 84 | 50 | 98 | 53 | 42 | 95 | 93 |
| Percentage cases resolved in four weeks | 100% | 100.00% | 92.00% | 100.00% | 84.00% | 96.15% | 98.00% | 53.00% | 84.00% | 95.00% | 93.00% |

## Customer Care / Helpline: Calls answered




**One month**

Operator(s) meeting benchmark: Airtel, Aircel, BSNL, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, Uninor, Vodafone

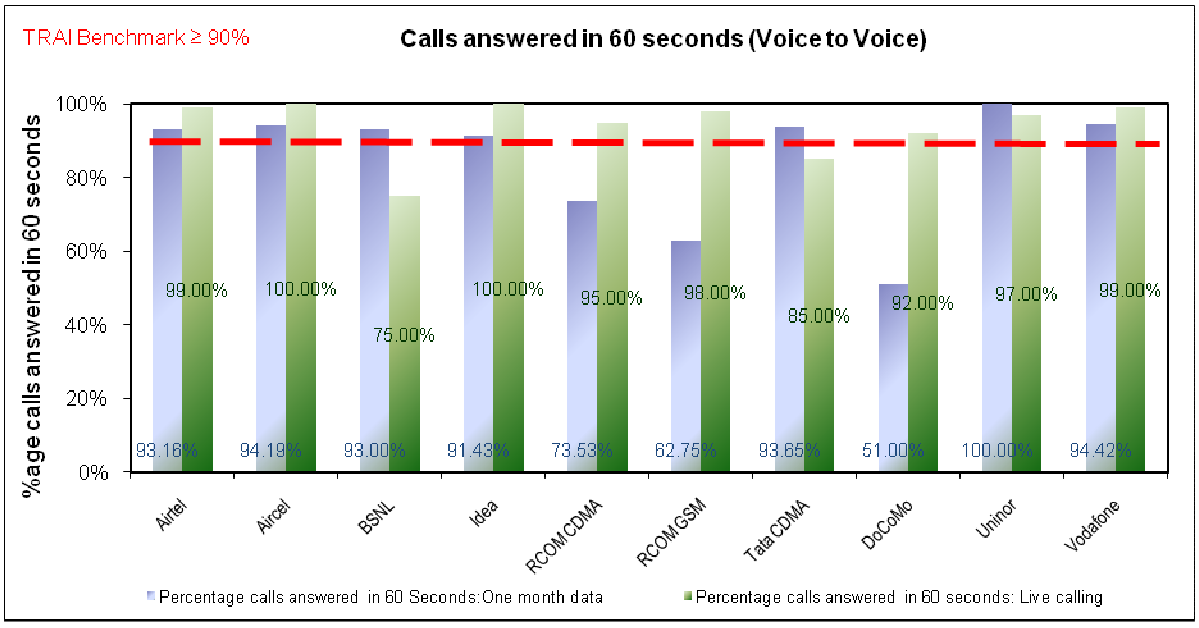
Operator(s) not meeting the benchmark: DoCoMo

**Live measurement**

Operator(s) meeting benchmark: Airtel, Aircel, BSNL, Idea, RCOM CDMA, RCOM GSM, DoCoMo, Uninor, Vodafone

Operator(s) not meeting the benchmark: Tata CDMA

## Customer Care / Helpline: Calls answered voice to voice



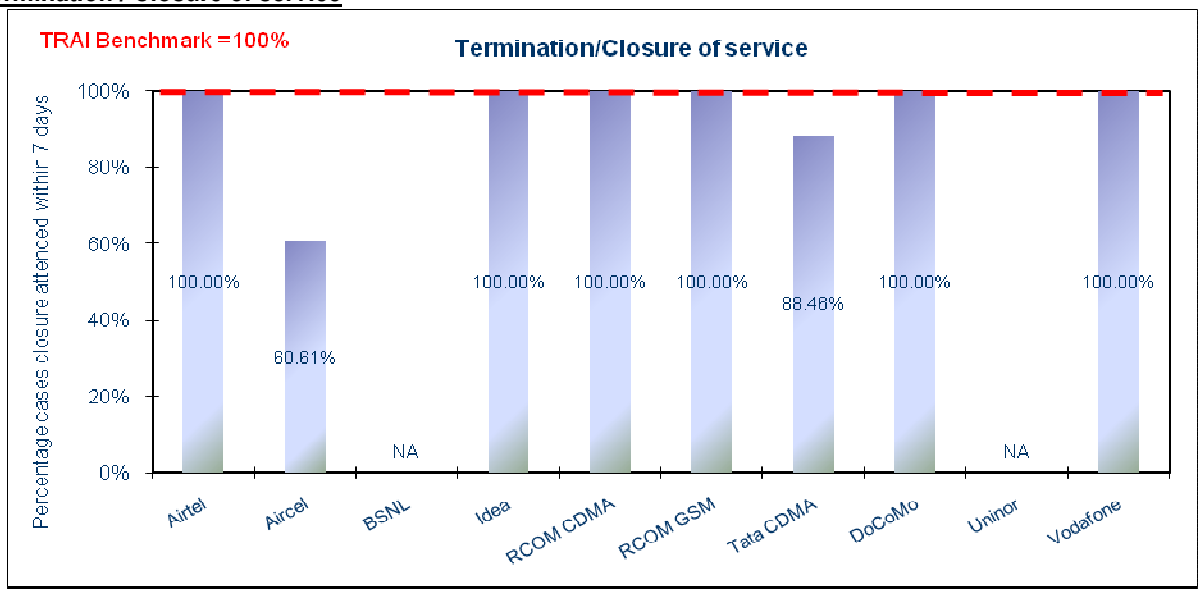
**One month**

Operator(s) meeting benchmark: Airtel, Aircel, BSNL, Idea, Tata CDMA, Uninor, Vodafone
Operator(s) not meeting the benchmark: RCOM CDMA, RCOM GSM, DoCoMo

**Live measurement**

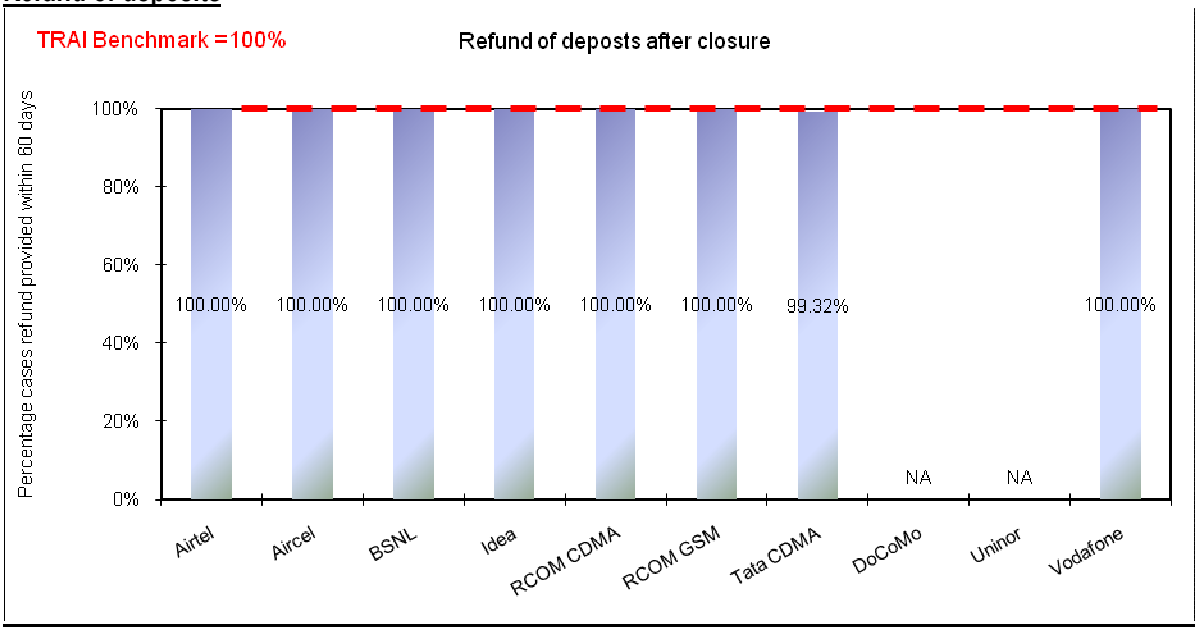
Operator(s) meeting benchmark: Airtel, Aircel, Idea, RCOM CDMA, RCOM GSM, DoCoMo, Uninor, Vodafone
Operator(s) not meeting the benchmark: BSNL, Tata CDMA

**Termination / Closure of service**




Operator(s) meeting benchmark: Airtel, Idea, RCOM CDMA, RCOM GSM, DoCoMo, Vodafone
Operator(s) not meeting the benchmark: Aircel, Tata CDMA

**Refund of deposits**



Operator(s) meeting benchmark: Airtel, Aircel, BSNL, Idea, RCOM CDMA, RCOM GSM, Vodafone
Operator(s) not meeting the benchmark: Tata CDMA

*Inter operator calls assessment*

| Inter operator call Assessment To ↓ From → | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|
| Airtel | NA | 100% | 98% | 100% | 100% | 99% | 99% | 99% | 99% | 100% |
| Aircel | 100% | NA | 98% | 99% | 100% | 99% | 99% | 100% | 100% | 100% |
| BSNL | 100% | 100% | NA | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Idea | 100% | 100% | 100% | NA | 100% | 100% | 100% | 100% | 100% | 100% |
| RCOM CDMA | 100% | 97% | 100% | 100% | NA | 100% | 98% | 100% | 99% | 100% |
| RCOM GSM | 100% | 99% | 100% | 100% | 100% | NA | 97% | 100% | 100% | 100% |
| Tata CDMA | 100% | 100% | 100% | 100% | 100% | 100% | NA | 99% | 100% | 100% |
| DoCoMo | 100% | 99% | 97% | 100% | 100% | 99% | 96% | NA | 99% | 100% |
| Uninor | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | NA | 100% |
| Vodafone | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | NA |

The maximum problem faced by the calling operator to other operators

In the inter-operator call assessment, calls were made from the test SIMs of service provider whose audit was being conducted to all the other service providers. BSNL, RCOM GSM and Tata CDMA found tough connecting to a DoCoMo number. Aircel had difficulty in connecting to a RCOM CDMA number with 97% of their calls getting completed.

# 12.0 Compliance reports: Results of Verification of PMR

## 12.1 Cellular Mobile services

| Name of Service Provider | | Network availability | | Connection Establishment (Accessibility) | | | Connection Maintenance (Retainability) | | | POI | Metering and Billing | | | | Response time to customer for assistance | | Termination of service | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | BTSs Accumulated downtime | Worst affected BTSs due to downtime | Call Set-up Success Rate | SDCCH/ Paging Chl. Congestion | TCH Congestion | Call Drop Rate | Worst affected cells having more than 3% TCH drop | %age of connection with good voice quality | Point of Interconnection (POI) Congestion | Metering and billing credibility - Postpaid | Metering and billing credibility - Prepaid | %age complaints resolved within 4 weeks | Period of applying credit/waiver less than 1 week | Accessibility of call centre/ customer care | %age of calls answered by the operators within 60 sec | %age requests for Termination within 7 days | Refund of deposits after closure within 60 days |
| **Benchmark** | | **≤ 2%** | **≤ 2%** | **≥ 95%** | **≤ 1%** | **≤ 2%** | **≤ 2%** | **≤ 5%** | **≥ 95%** | **≤ 0.5%** | **≤ 0.1%** | **≤ 0.1%** | **100%** | **100%** | **≥ 95%** | **≥ 90%** | **100%** | **100%** |
| Airtel | PMR | 0.17% | 0.53% | 96.74% | 0.62% | 1.30% | 1.47% | 11.59% | 95.34% | 0.00% | 0.10% | 0.00% | 100.00% | 100.00% | 97.72% | 92.00% | 99.00% | 100.00% |
| | IMRB | 0.18% | 0.53% | 96.88% | 0.62% | 1.30% | 1.44% | 11.59% | 96.26% | 0.00% | 0.10% | 0.00% | 100.00% | 100.00% | 89.00% | 92.00% | 99.00% | 100.00% |
| Aircel | PMR | 0.30% | 2.20% | 98.64% | 0.19% | 0.08% | 0.45% | 3.84% | 98.36% | 0.00% | 1.60% | 0.40% | 100.00% | 100.00% | 100.00% | 37.00% | 26.27% | 100.00% |
| | IMRB | 0.29% | 2.10% | 99.12% | 0.03% | 0.07% | 0.40% | 4.31% | 98.40% | 0.41% | 1.60% | 0.40% | 99.40% | 100.00% | 100.00% | 36.90% | 15.00% | 58.00% |
| BSNL | PMR | 0.50% | 1.15% | 96.00% | 0.46% | 1.34% | 1.59% | 9.46% | 98.00% | 0.00% | 0.00% | 0.00% | 100.00% | 100.00% | 100.00% | 76.07% | 100.00% | 100.00% |
| | IMRB | 0.50% | 1.17% | 95.97% | 0.47% | 1.30% | 1.60% | 9.40% | 98.00% | 0.00% | 0.00% | 0.29% | 100.00% | 100.00% | 100.00% | 75.00% | 100.00% | 100.00% |
| Idea | PMR | 0.04% | 0.03% | 99.92% | 0.38% | 0.41% | 0.73% | 4.80% | 96.35% | 0.00% | 0.00% | 0.01% | 100.00% | 100.00% | 99.80% | 98.00% | 100.00% | 100.00% |
| | IMRB | 0.04% | 0.03% | 99.92% | 0.38% | 0.42% | 0.73% | 4.80% | 96.36% | 0.00% | 0.03% | 0.01% | 100.00% | 100.00% | 99.00% | 96.00% | 100.00% | 100.00% |
| RCOM CDMA | PMR | 0.13% | 0.86% | 99.44% | 0.00% | 0.08% | 0.77% | 1.79% | 99.54% | 0.00% | 0.10% | 0.03% | 100.00% | 100.00% | 93.00% | 84.00% | 100.00% | 100.00% |
| | IMRB | 0.13% | 0.86% | 99.44% | 0.00% | 0.08% | 0.77% | 1.79% | 99.54% | 0.00% | 0.10% | 0.03% | 100.00% | 100.00% | 82.00% | 84.00% | 100.00% | 100.00% |
| Tata CDMA | PMR | 0.04% | 0.00% | 98.91% | 0.00% | 0.05% | 0.43% | 0.42% | 98.51% | 0.34% | 0.02% | 0.04% | 100.00% | 100.00% | 91.00% | 70.00% | 95.01% | 100.00% |
| | IMRB | 0.04% | 0.00% | 99.00% | 0.00% | 0.05% | 0.43% | 0.43% | 98.51% | 0.34% | 0.02% | 0.04% | 100.00% | 100.00% | 91.00% | 70.00% | 95.00% | 100.00% |
| Vodafone | PMR | 0.22% | 0.06% | 99.07% | 0.17% | 0.30% | 0.79% | 5.60% | 98.23% | 0.33% | 0.09% | 0.01% | 100.00% | 100.00% | 100.00% | 91.00% | 100.00% | 100.00% |
| | IMRB | 0.22% | 0.06% | 99.07% | 0.20% | 0.30% | 0.79% | 5.50% | 98.23% | 0.42% | 0.09% | 0.04% | 100.00% | 100.00% | 100.00% | 87.00% | 100.00% | 100.00% |

As per the PMR submitted by the operators in the 3rd quarter of 2009

Figures do not match with those reported in PMR

Figures verified on all India basis

Not meeting benchmark

B'mark = TRAI Benchmark, DNA = Details not available

# 13.0 Conclusions

## 13.1 Cellular Mobile services

1. The figures reported by all the operators were found to be not completely matching with the figures obtained on verification with small rounding off errors
2. Bharti, BSNL and Vodafone do not meet the benchmark for worst affected cells during the period of July, August and September 2009.
3. All operators except Airtel and Idea fail to meet the benchmark for percentage calls answered by the operator in 60 seconds
4. Aircel does not meet the benchmark on following parameters - worst affected cells, Metering & Billing Postpaid and Prepaid, response time to customer for assistance and Termination of service within 7 days.

# Section C
# BROADBAND

# 14.0 Sampling Methodology

## 14.1 Sampling for Broadband service providers

- Audits for various Broadband service providers were conducted at the service provider's central node. Since most of the private operators have a centralized system of monitoring their network data was obtained for all the Point of Presence (POPs) present in the circle.
- For BSNL, Audit was conducted at the various exchanges/POPs providing Broadband service was verified and collected. This was done in such a way that at least 5% of POPs spread across 10% of SDCA's were covered
- For BSNL, the data pertaining to network related parameters was obtained by IMRB Auditors at the central NOC in Bangalore.
- For Sify, the data pertaining to network related parameters was obtained by IMRB Auditors at the central NOC in Chennai.
- For Reliance and VSNL, the data pertaining to all parameters was obtained by IMRB Auditors at the central NOC in Mumbai.
- Following Broadband service providers were Audited in Andhra Pradesh circle:

| | Name of Operator |
|---|---|
| Operator 1 | Airtel |
| Operator 2 | BSNL |
| Operator 3 | Hathway |
| Operator 4 | RCOM |
| Operator 5 | Sify |
| Operator 6 | You Telecom |
| Operator 7 | VSNL |

# 15.0 Audit methodology

## 15.1 Broadband Services

In a nutshell, the audit methodology was as follows:

| | Parameters | Verification of PMR | Three day live measurement | Data Verification for one month | Live calling |
|---|---|---|---|---|---|
| (i) | Service Provisioning/ Activation time | YES | YES | YES | YES |
| (ii) | Fault Repair/ Restoration Time | YES | YES | YES | YES |
| (iii) | Billing Performance | | | | |
| - | Billing Complaints per 100 Bills issued | YES | YES | YES | |
| - | %age of billing complaints resolved in four weeks | YES | YES | YES | YES |
| - | Time taken for refund of deposits after closure | YES | YES | YES | YES |
| (iv) | Response time to the customer for assistance(Voice to Voice) | | | | |
| - | *Within 60 seconds > 60%* | YES | YES | YES | YES |
| - | *Within 90 seconds > 90%* | YES | YES | YES | YES |
| (V) | Bandwidth Utilization/ Throughput: | | | | |
| ▪ | *A)Bandwidth Utilization* | | | | |
| - | POP to ISP gateway Node [Intra – network] Links | YES | YES | YES | |
| - | ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for international connectivity | YES | YES | YES | |
| ▪ | *B) Broadband Connection Speed (Download)* | YES | YES | YES | YES |
| (vi) | Service availability / Uptime | YES | YES | YES | |
| vii) | Packet Loss | YES | YES | YES | |
| (viii) | Network Latency for wired broadband access) | | | | |
| - | *User reference point at POP / ISP Gateway Note to International Gateway (IGSP/NIXI)* | YES | YES | YES | |
| - | *User reference point at ISP Gateway Node to International nearest NAP port abroad ( Satellite)* | YES | YES | YES | |
| - | *User reference point at ISP Gateway Node to International nearest NAP port abroad ( Satellite)* | YES | YES | YES | |

{Note: A more detailed explanation of parameter wise audit methodology for Broadband services is explained in Annexure II}

# 16.0 Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Broadband service providers during the period starting from January 2010 to March 2010 in Andhra Pradesh circle.

## 16.1 Service provider performance report based on one month data Verification – Broadband Services

| Parameters | Benchmarks | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| **Service provisioning uptime** | | | | | | | | |
| Percentage connections provided within 15 days | 100% | 100.00% | 95.75% | 100.00% | 100.00% | 100.00% | 99.68% | 99.77% |
| **Fault repair restoration time** | | | | | | | | |
| Percentage faults repaired by next working days | > 90% | 95.42% | 77.00% | 91.20% | 100.00% | 89.14% | 85.74% | 95.69% |
| Percentage faults repaired within three working days | > 99% | 99.20% | 95.42% | 99.65% | 100.00% | 100.00% | 96.27% | 99.12% |
| **Billing performance** | | | | | | | | |
| Billing complaints per 100 bills issued | < 2% | 0.05% | 0.07% | 1.81% | 0.08% | NA | 0.14% | 0.50% |
| %age of billing complaints resolved in 4 weeks | 100% | 100.00% | 100.00% | 100.00% | 100.00% | NA | 100.00% | 100.00% |
| %age cases in which refund of deposits after closure was made in 60 days | 100% | 100.00% | 100.00% | 93.85% | 100.00% | NA | 56.84% | NA |
| **Customer care/helpline assessment (Voice to Voice)** | | | | | | | | |
| Percentage calls answered within 60 seconds | > 60% | 95.53% | 94.94% | 100.00% | 82.00% | 100.00% | 88.97% | 98.62% |
| Percentage calls answered within 90 seconds | > 80% | 97.33% | 99.40% | 100.00% | 84.00% | 100.00% | 92.96% | 98.66% |
| **Bandwidth utilization/Throughput** | | | | | | | | |
| Intra network links (POP to ISP Node) | | 254 | 152 | 6 | 19 | 420 | NA | 16 |
| Total number of intra network links > 90% | | 0 | 4 | 0 | 0 | 0 | NA | 0 |
| Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP) | | 1 | 296 | 5 | 9 | 23 | 4 | 38 |
| Percentage bandwidth utilized on upstream links | < 80% | 85.71% | 80.44% | 87.89% | 39.84% | 87.33% | 76.32% | 40.78% |
| Broadband download speed | > 80% | 109.50% | 90.00% | 82.00% | 90.00% | 95.00% | 85.00% | 100.00% |
| Service availability/uptime | > 98% | 100.00% | 99.95% | 99.48% | 100.00% | 100.00% | 98.39% | 98.01% |
| Packet loss | < 1% | 0.00% | 0.00% | 0.10% | 0.15% | 0.00% | 0.10% | 0.00% |
| **Network Latency** | | | | | | | | |
| POP/ISP Node to NIXI | < 120 msec | 25 | 20 | 5 | 0 | < 45 | 14 | < 80 |
| ISP node to NAP port (Terrestrial) | < 350 msec | 242 | 242 | 244 | 15.8 | < 300 | 250 | < 250 |

{*Note: For BSNL data pertains to the sample 5% of exchanges audited during the audit period, whereas for rest of the operators figures pertain to all the exchanges present in the circle}

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

**B'mark** = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

**Critical findings and Key take outs: Broadband services**

Before concluding the Audit findings for Broadband services we would like to accentuate the fact that some service providers claimed that they were submitting the PMR basis their inference of the QoS parameters. Also, there were differences observed in level of reporting for e.g. Sify, and BSNL (for network related parameters) consider all India as one circle and VSNL has been reporting PMR on the regional basis where 1 region would cover multiple circles. In fact the findings reported herewith for some of the parameters for these operators are on an all India basis.

The key conclusions (Parameter wise) emerging out from the Audit exercise of five broadband service providers in Andhra Pradesh circle are highlighted below

*Service provisioning/Activation time*

- BSNL (95.75%), You Telecom (99.68%) and VSNL (99.77%) marginally fall short of TRAI benchmark of 100% connections to be provided within 15 days.
- For Live calling carried out by IMRB auditors none of the service provider except RCOM and Hathway was able to meet the benchmark of 100% connections to be provided within 15 days.

*Fault Repair/Restoration time*

- BSNL, Sify and You Telecom are falling below the benchmark for fault repair within next working day.
- All service providers except BSNL and You Telecom are meeting the TRAI specified benchmark of 99% for fault repair within three working days
- TRAI can consider including Mean Time to Repair (MTTR) for faults as one of the parameters for measuring Quality of Services (QoS) in future for Broadband services as well.
- Also, Sify was found to be reporting only those fault complaints which are booked at the call centre. All the fault complaints booked at the cable operator's end are not taken into consideration while reporting in PMR

*Billing performance*

- All the service providers were found to be meeting the benchmark of percentage billings complaints received and time taken for resolution of billing complaints for the month in which data was collected.
- Sify however claim that all its retail broadband customers are prepaid and hence there are no billing complaints for Sify.

*Customer Care/Helpline Assessment*

- All the operators meet the TRAI specified benchmark for calls answered by the operator in 60 and 90 seconds for the month in which audit was carried out
- For live calling done by IMRB auditors all service providers were found to meeting TRAI specified benchmark for calls answered by the operator in 60 and 90 seconds
- TRAI can look into making benchmark of Customer care/Helpline assessment for Broadband services more stringent in line with Basic and Cellular services

*Bandwidth Utilization:*

- All the service providers were found to be using Multiple Router Traffic Grapher (MRTG) to measure the bandwidth utilization at intra network links.
- All the service providers were found to be reporting combined bandwidth utilization for corporate and household customers as there is no mechanism available to provide it separately for different users.

- For Intra network link, data for Sify, RCOM and BSNL was obtained on all India bases. 4 of the 152 links tested for BSNL was found to be having above 90% bandwidth utilization for the month in which audit was carried out.
- It was observed that all the links (tested during three day live measurement) in the access segment for most of the service providers were found be below 80%.
- For Bandwidth utilization on upstream links (From ISP Node to IGSP/NIXI), operators Airtel, Hathway, Sify and BSNL do not meet the TRAI specified benchmark.

*Download speed*

- During live measurements carried out at Pop's/ISP Node it was observed that all the operators are meeting the TRAI prescribed benchmark of greater than 80% speed available to the customer. These measurements were carried out by IMRB auditors on a sample basis during visits at PoPs and ISP Node
- However, no historic data was available for verification of records for month of Audit as well as quarter ending July to September 2009 with the service providers. Most of them claimed that they are reporting to TRAI basis live tests conducted at customer premises during field visits and tests conducted at POPs/ISP Node

*Service Availability/Uptime:*

- All the service providers are meeting the benchmark on service availability/uptime for the month of audit and 3 day live measurement carried out.

*Packet Loss and Network Latency*

- It was observed that almost all the service providers are measuring packet loss and latency by conducting random ping tests for their internal performance measurement.
- The verification of the records of old ping tests was done through latency graphs (available from smoke ping tool) for some of the operators.
- However, ping tests conducted/smoked ping results during live measurements revealed that all the service providers are meeting the benchmark prescribed by TRAI.

## Summary of Live Measurement Results – Broadband Services

| Parameters | Benchmarks | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| **Service provisioning uptime** | | | | | | | | |
| Percentage connections provided within 15 days | 100% | 99.00% | 96.00% | 100.00% | 100.00% | 99.00% | 97.00% | 82.00% |
| **Fault repair restoration time** | | | | | | | | |
| Percentage faults repaired by next working days | > 90% | 96.67% | 16.67% | 96.67% | 20.00% | 23.33% | 30.00% | 20.00% |
| Percentage faults repaired within three working days | > 99% | 100.00% | 70.00% | 96.67% | 70.00% | 56.67% | 56.67% | 73.33% |
| **Billing performance** | | | | | | | | |
| %age of billing complaints resolved in 4 weeks | 100% | 96.25% | 100.00% | 100.00% | 75.00% | NA | 100.00% | 55.88% |
| **Customer care/helpline assessment (Voice to Voice)** | | | | | | | | |
| Percentage calls answered within 60 seconds | > 60% | 98.00% | 100.00% | 100.00% | 85.00% | 95.00% | 100.00% | 83.00% |
| Percentage calls answered within 90 seconds | > 80% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |
| **Bandwidth utilization/Throughput** | | | | | | | | |
| Intra network links (POP to ISP Node) | | 254 | 152 | 6 | 19 | 420 | NA | 16 |
| Total number of intra network links > 90% | | 0 | 0 | 0 | 0 | 0 | NA | 0 |
| Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP) | | 1 | 325 | 5 | 9 | 23 | 4 | 38 |
| Percentage bandwidth utilized on upstream links | < 80% | 81.62% | 65.56% | 86.04% | 39.84% | 87.33% | 68.42% | 40.78% |
| Broadband download speed | > 80% | 109.50% | 90.00% | 82.00% | 90.00% | 95.00% | 85.00% | 100.00% |
| Service availability/uptime | > 98% | 100.00% | 99.92% | 99.24% | 100.00% | 98.61% | 100.00% | 98.64% |
| Packet loss | < 1% | 0.00% | 0.00% | 0.10% | 0.00% | 0.00% | 0.10% | 0.00% |
| **Network Latency** | | | | | | | | |
| POP/ISP Node to NIXI | < 120 msec | 41 | 19 | 1 | 0 | 40 | 15 | 30 |
| ISP node to NAP port (Terrestrial) | < 350 msec | 251 | 228 | 36 | 50 | 286 | 273 | 252 |

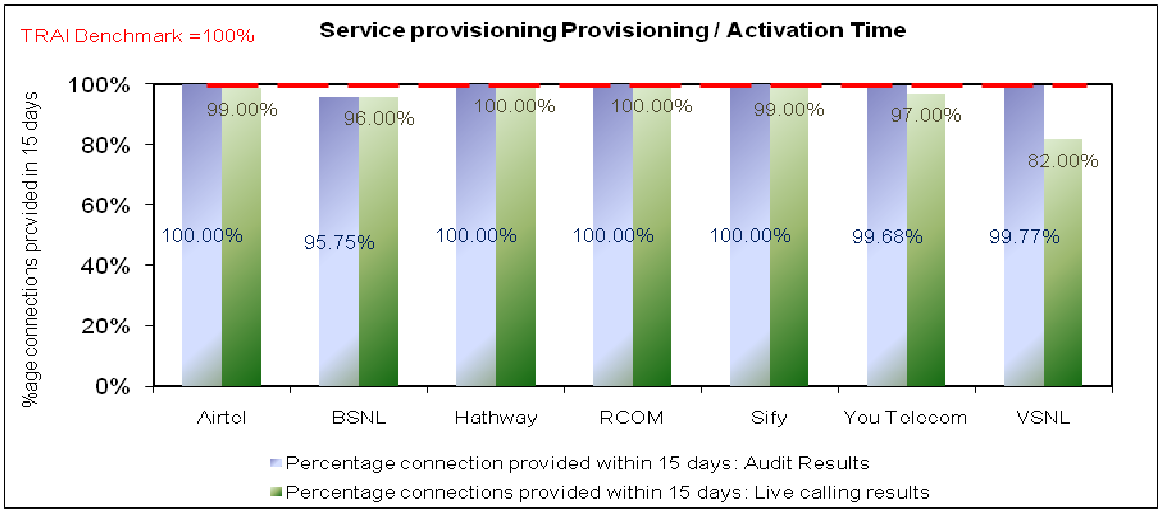
** Methodology not in line with QoS  Figures provided on All India basis  Not meeting the benchmark  **B'mark** = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

- All the service providers are meeting the benchmark on service availability/uptime for three day live measurements
- The testing for Bandwidth utilization during live measurement was carried out on sample basis by IMRB auditors for intra network links. None of the links tested for these operators was found to be having above 90% bandwidth utilization for the month in which audit was carried out
- For Bandwidth utilization on upstream links, all the service providers except Hathway, Sify and Airtel are meeting the benchmark during the three day live measurement and have excess capacities available on their upstream links.
- For network latency all the service providers comfortably meet the TRAI specified benchmark for ping tests carried out during live measurements.

# 17.0 Detailed findings – Includes comparison between Live calling/Live measurements and One month data collection for Broadband Services

## 17.1 Graphical/Tabular Representations for Broadband services

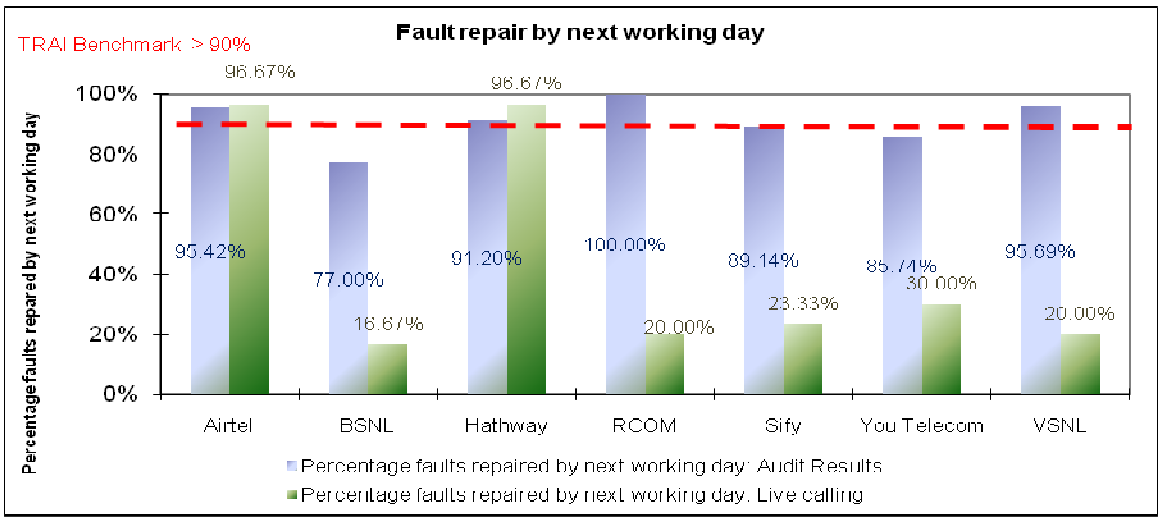
**Service provisioning / Activation time (Comparison between one month audit results and live calling results)**




**One month**
Operator meeting benchmark: Airtel, Hathway, RCOM, Sify
Operator not meeting benchmark: BSNL, You Telecom, VSNL

**Live calling**
Operator meeting benchmark: Hathway, RCOM
Operator not meeting benchmark: Airtel, BSNL, Sify, You Telecom, VSNL

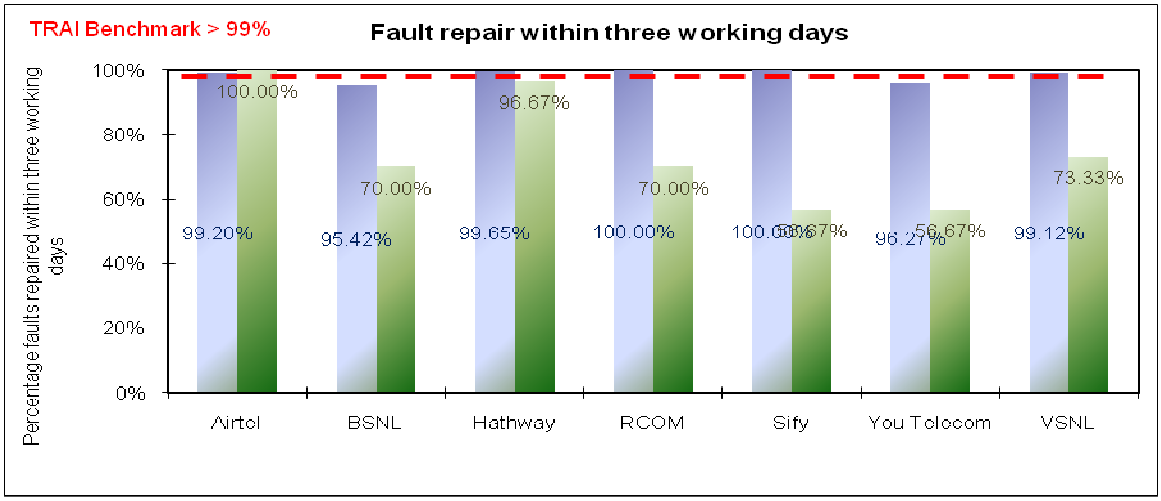
**Fault repair/Restoration time (By next working day)- Comparison between one month audit results and live calling results**



**One month**
Operator meeting benchmark: Airtel, Hathway, RCOM, VSNL
Operator not meeting benchmark: BSNL, Sify, You Telecom

**Live calling**
Operator meeting benchmark: Airtel, Hathway
Operator not meeting benchmark: BSNL, RCOM, Sify, You Telecom, VSNL

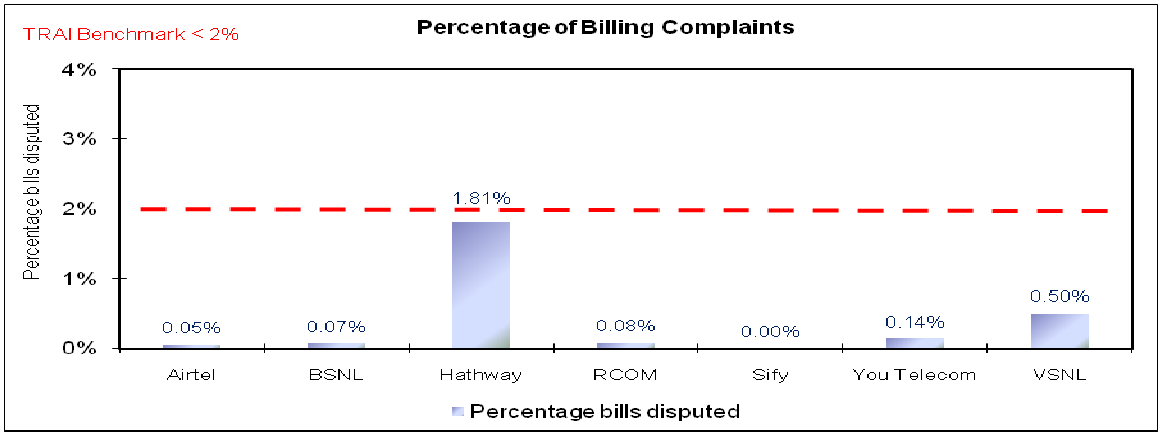
**Fault repair/Restoration time within three working days (Comparison between one month audit results and live calling results**




**One month**
Operator meeting benchmark: Airtel, Hathway, RCOM, Sify, VSNL
Operator not meeting benchmark: BSNL, You Telecom

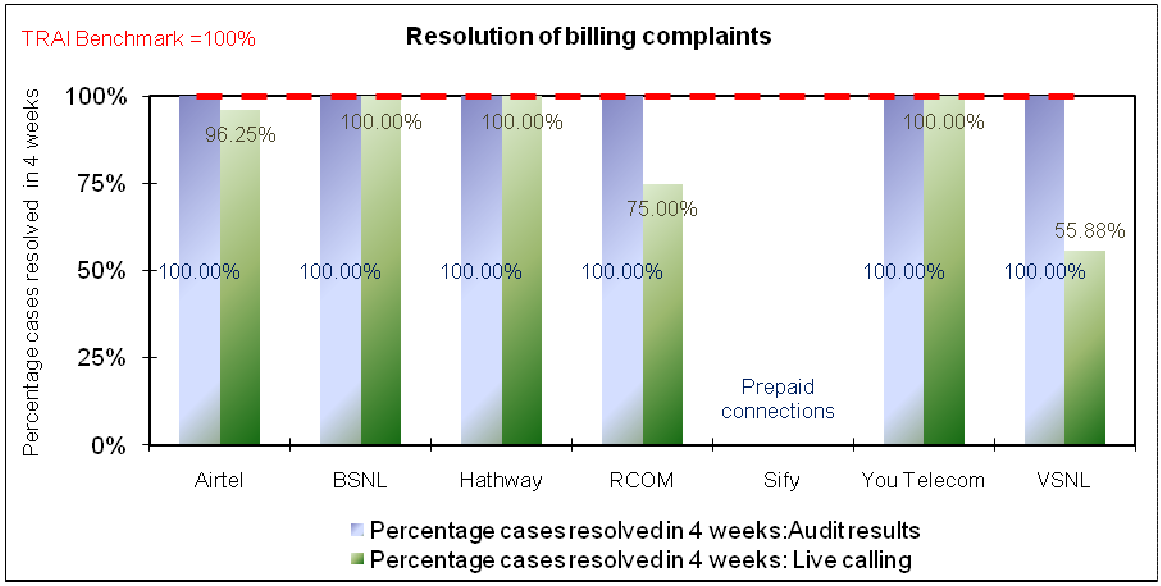
**Live calling**
Operator meeting benchmark: Airtel
Operator not meeting benchmark: BSNL, Hathway, RCOM, Sify, You Telecom, VSNL

**Percentage bills disputed**




All operators are meeting the benchmark

## Resolution of billing complaints (Comparison between one month audit results and live calling results)




**One month**

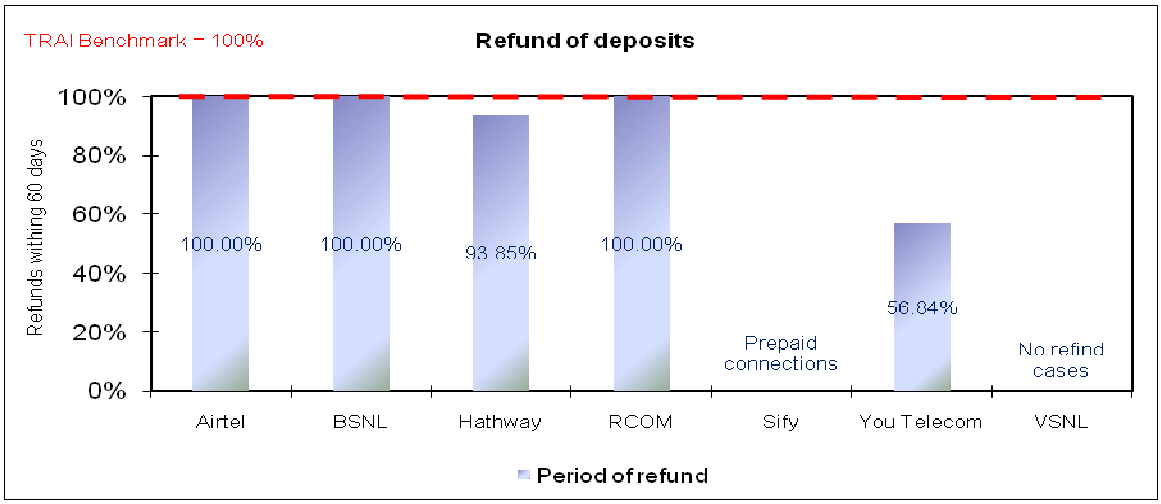
All operators are meeting the benchmark

**Live calling**

Operator meeting benchmark: BSNL, Hathway, You Telecom

Operator not meeting benchmark: Airtel, RCOM, VSNL

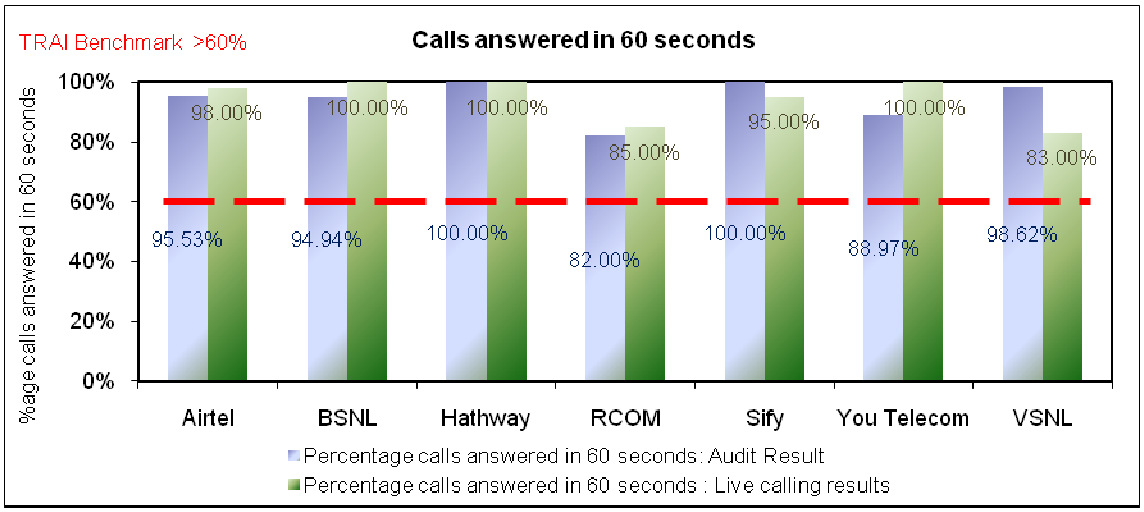
## Refund of deposits after closure




Operator meeting benchmark: Airtel, BSNL, RCOM

Operator not meeting benchmark: Hathway, You Telecom

**Response time to customer for assistance - Calls answered by the operator within 60 seconds (Comparison between one month audit results and live calling results)**



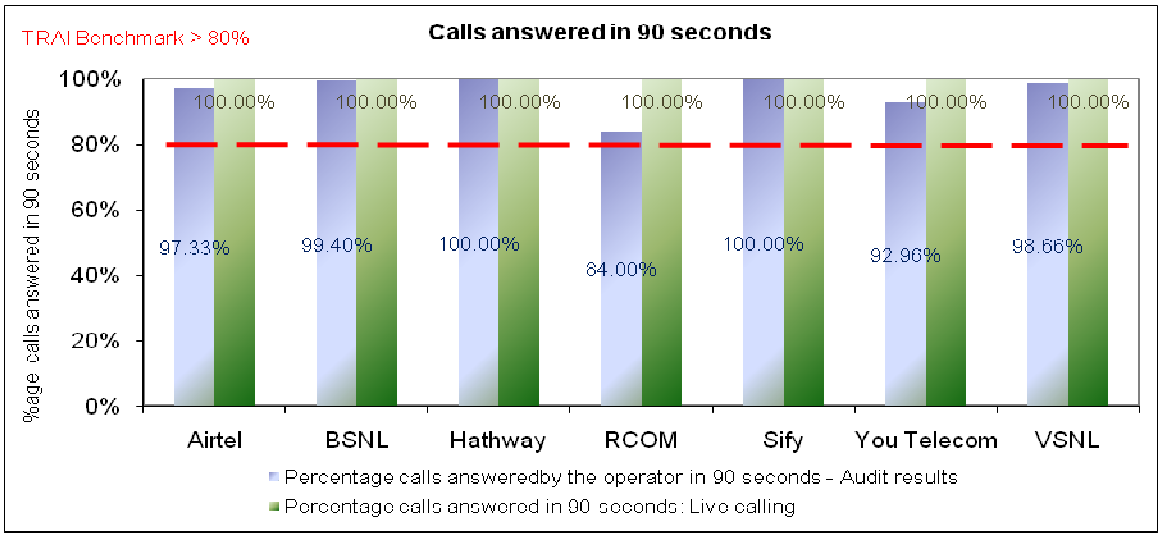

**One month**

All operators are meeting the benchmark

**Live calling**

All operators are meeting the benchmark

**Response time to customer for assistance - Calls answered by the operator within 90 seconds (Comparison between one month audit results and live calling results)**




**One month**

All operators are meeting the benchmark

**Live calling**

All operators are meeting the benchmark

**Bandwidth utilization at Intra network links (Comparison between one month audit results and live measurement results)**

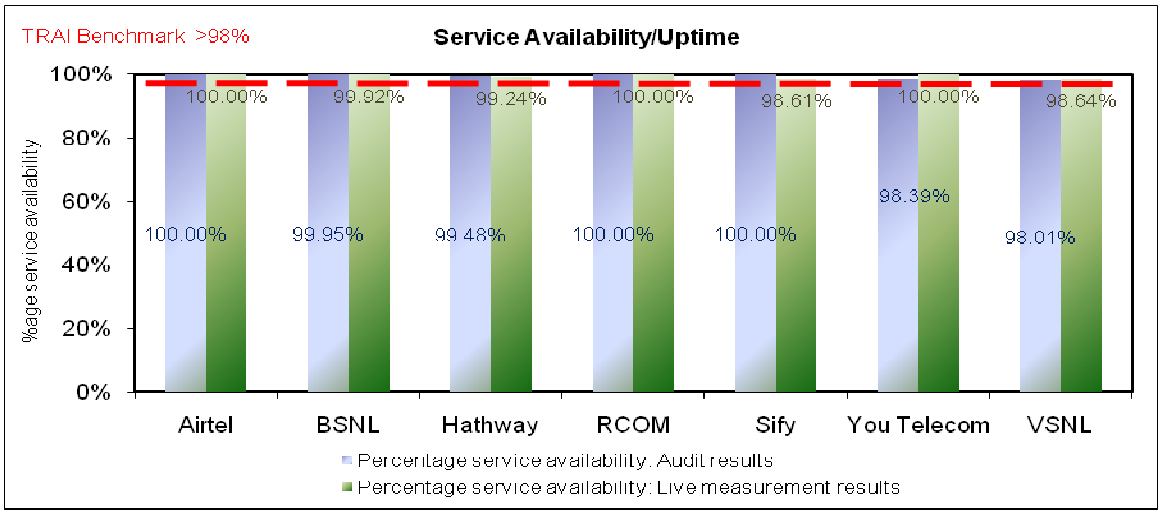
| Bandwidth Utilization (One month) | B'mark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| Total number of intra network links | | 254 | 152 | 6 | 19 | 420 | NA | 16 |
| No of Intra network found to be above 90% | | 0 | 4 | 0 | 0 | 0 | NA | 0 |

| Bandwidth Utilization (Live measurement) | B'mark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| Total number of intra network links | | 254 | 152 | 6 | 19 | 420 | NA | 16 |
| No of Intra network found to be above 90% | | 0 | 0 | 0 | 0 | 0 | NA | 0 |

| Broadband download speed | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| Total committed download speed to the sample subscribers (In mpbs) (A) | | 2 | 2 | 1 | 1 | 1 | 2 | 2 |
| Total average download speed observed during TCBH (In Mpbs) (B) | | 2.19 | 1.8 | 0.82 | 0.9 | 0.95 | 1.7 | 2 |
| %age subscribed speed available to the subscriber during TCBH (B/A)*100 | >80% | 109.50% | 90.00% | 82.00% | 90.00% | 95.00% | 85.00% | 100.00% |

As far as bandwidth utilization on the intra network links is concerned all the operators seem to performing well as all the sample intra network links tested during live measurement were found to be below 90%.

**Service availability/Uptime (Comparison between one month audit results and live measurement results)**




**One month**

All operators are meeting the benchmark

**Live calling**

All operators are meeting the benchmark

# 18.0 Compliance reports: Results of Verification of Records

## 18.1 Broadband services

| Parameters | B'marks | Airtel | | BSNL* | | Hathway | | RCOM | | Sify | | You Telecom | | VSNL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PMR | IMRB | PMR | IMRB | PMR | IMRB | PMR | IMRB | PMR | IMRB | PMR | IMRB | PMR | IMRB |
| **Service provisioning uptime** | | | | | | | | | | | | | | | |
| Percentage connections provided within 15 days | 100% | 100.00% | 100.00% | 90.90% | 83.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |
| **Fault repair restoration time** | | | | | | | | | | | | | | | |
| Percentage faults repaired by next working days | > 90% | 94.83% | 94.83% | 94.60% | 77.00% | 98.00% | 98.00% | 100.00% | 100.00% | 90.00% | 91.00% | 95.00% | 98.00% | 91.00% | 91.00% |
| Percentage faults repaired within three working days | > 99% | 98.17% | 98.17% | 99.80% | 96.00% | 100.00% | 100.00% | 100.00% | 100.00% | 99.00% | 100.00% | 99.49% | 100.00% | 98.00% | 98.00% |
| **Billing performance** | | | | | | | | | | | | | | | |
| Billing complaints per 100 bills issued | < 2% | 0.00% | 0.00% | 1.50% | 0.10% | 1.80% | 1.80% | 0.37% | 0.37% | NA | NA | 0.63% | 0.38% | 0.65% | 0.65% |
| %age of billing complaints resolved in 4 weeks | 100% | 100.00% | 100.00% | 99.60% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | NA | NA | 100.00% | 100.00% | 100.00% | 100.00% |
| %age cases in which refund of deposits after closure was made in 60 days | 100% | 100.00% | 100.00% | 99.80% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | NA | NA | 59.00% | 54.00% | 100.00% | 100.00% |
| **Customer care/helpline assessment (Voice to Voice)** | | | | | | | | | | | | | | | |
| Percentage calls answered within 60 seconds | > 60% | 93.85% | 93.85% | 89.20% | 92.90% | 100.00% | 100.00% | 85.00% | 85.00% | 90.00% | 100.00% | 83.00% | 84.60% | 78.13% | 78.13% |
| Percentage calls answered within 90 seconds | > 80% | 95.60% | 95.60% | 93.70% | 97.60% | 100.00% | 100.00% | 87.00% | 87.00% | 100.00% | 100.00% | 88.00% | 89.30% | 81.74% | 81.74% |
| **Bandwidth utilization/Throughput** | | | | | | | | | | | | | | | |
| Intra network links (POP to ISP Node) | | 821 | 821 | Project 2.2:- BRAS-23, T1-24, T2-624, DSLAM-5960, Multiplay Phase 1&2:- BNG-18, RPR-1181, OCLAN-2906, DSLAM-37036 | 220 | 1 | 1 | 73 | 73 | 421 | 421 | 4 | 4 | 19 | 19 |
| Total number of intra network links > 90% | | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP) | | 6 | 6 | 285 | 259 | 363.5 + 2Mb Nixi | 4 | 61277 | 61277 | 2763 | 2763 | 20 | 20 | 57142 | 57142 |
| Percentage bandwidth utilised on upstream links | < 80% | 84.32% | 84.32% | 71.10% | 71.10% | 84.00% | 84.00% | 34.00% | 34.00% | 85.00% | 85.00% | 77.47% | 77.47% | 46.26% | 46.26% |
| Broadband download speed | > 80% | 100.00% | 100.00% | 93.10% | 93.10% | 85.00% | 85.00% | 90.00% | 90.00% | 95.00% | 95.00% | 85.00% | 85.00% | > 80% | > 80% |
| Service availability/uptime | > 98% | 99.99% | 99.99% | 99.10% | 99.10% | 99.00% | 99.00% | 99.83% | 99.83% | 100.00% | 100.00% | 99.01% | 99.01% | 98.70% | 98.70% |
| Packet loss | < 1% | 0.00% | 0.00% | 0.04% | 0.04% | 0.95% | 0.95% | < 1% | 0.48% | < 1% | < 1% | < 1% | 0.10% | 0.00% | 0.00% |
| **Network Latency** | | | | | | | | | | | | | | | |
| POP/ISP Node to NIXI ( in msec) | < 120 msec | 26 | 26 | 12 | 12 | 80 | 80 | < 45 | 48 | < 45 | < 45 | < 40 | 21 | < 80 | < 80 |
| ISP node to NAP port (Terresrtrial) ( in msec) | < 350 msec | 271 | 271 | 234 | 234 | 320 | 320 | < 300 | 233 | < 300 | < 300 | < 300 | 271.3 | < 250 | < 250 |

* These have been calculated cumulatively on the basis of figures reported by various exchanges

Figures do not match with those reported in PMR  Not meeting the benchmark  **B'mark** = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

## 18.2 Conclusions

### Broadband services

1. Complete data for Sify was verified on an all India level
2. For BSNL there is slight variation observed in for some parameters when compared to the figures reported in PMR. But the reason is largely the fact that data was obtained for sample 5% of exchanges whereas reporting is done for 100% of exchanges.
3. Also for You telecom the PMR data for all parameters was reported on All India level but we have got the data for non network parameters only for Andhra Pradesh circle
4. Historic data for Broadband download speed and Ping test conducted to check the latency and packet loss was not available for verification for most of the service providers
5. Service providers were found to not meeting benchmark on service provisioning and fault repair parameters

# 19.0 Annexure - I (Wireline)

| Name of the Service Provider | Name of POI not meeting the benchmark | Total No. of circuits on POI | Total No. of call attempts on POI | Total traffic served on POI (Erlang) | % of Congestion POI | Action already taken/ action plan for meeting the benchmark |
|---|---|---|---|---|---|---|
| BSNL | All POIs meeting benchmark | | | | | |
| Airtel | All POIs meeting benchmark | | | | | |
| TTSL | All POIs meeting benchmark | | | | | |
| RCOM | All POIs meeting benchmark | | | | | |

## 19.1 Parameter wise performance reports for Basic Wireline services

**1 Audit Results for Fault repair**

| Fault incidences | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Faults incidences ( No. of faults/100 Subs./month) | ≤ 5 | 3.28 | 2.80 | 0.3 | 1.41 |

| Fault repair (Urban areas) | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total No. of faults registered during the month | | 5208 | 3209 | 334 | 1179 |
| No. of faults repaired by next working day during the month | | 4823 | 3169 | 271 | 1173 |
| Percentage of faults repaired by next working day during the month | ≥ 90% | 92.61% | 98.75% | 81.14% | 99.49% |
| No. of faults repaired within 3 days during the month | | 4980 | 3204 | 308 | 1179 |
| Percentage of faults repaired within 3 days during the month | 100% | 95.62% | 99.84% | 92.22% | 100.00% |

| Fault repair (Rural & Hilly areas) | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total No. of faults registered during the month | | 753 | NA | NA | NA |
| No. of faults repaired by next working day during the month | | 709 | NA | NA | NA |
| Percentage of faults repaired by next working day during the month | ≥ 90% | 94.16% | NA | NA | NA |
| No. of faults repaired within 5 days during the month | | 752 | NA | NA | NA |
| Percentage of faults repaired within 5 days during the month | 100% | 99.87% | NA | NA | NA |

| Rent rebate | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| No. of cases with faults pending for >3 days and ≤7 days | | 67 | 5 | 2 | 0 |
| Out of these number of cases where rent rebate for 7 days was given | | 67 | 5 | 2 | 0 |
| Percentage of cases where rent rebate for 7 days was given | 100% | 100.00% | 100.00% | 100.00% | NA |
| No. of cases with faults pending for >7 days and ≤15 days | | 28 | 0 | 0 | 0 |
| Out of these number of cases where rent rebate for 15 days was given | | 28 | 0 | 0 | 0 |
| Percentage of cases where rent rebate for 15 days was given | 100% | 100.00% | NA | NA | NA |
| No. of cases with faults pending for ≥15 days | | 28 | 0 | 0 | 0 |
| Out of these number of cases where rent rebate for 30 days was given | | 28 | 0 | 0 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| Percentage of cases where rent rebate for 30 days was given | 100% | 100.00% | NA | NA | NA |

| MTTR | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Mean time taken to repair the fault in hours | ≤ 8 | 7.74 | 5.01 | 8.78 | 3.02 |

**2. Live calling for fault repair**

| Urban area | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total Number of calls made | | 845 | 30 | 30 | 30 |
| Number of cases where faults were repaired by next working day | | 331 | 28 | 18 | 14 |
| Percentage cases where faults were repaired by next working day | ≥ 90% | 39.17% | 93.33% | 60.00% | 46.67% |
| Number of cases where faults were repaired within 3 days | | 647 | 30 | 28 | 25 |
| Percentage cases where faults were repaired within 3 days | 100% | 76.57% | 100.00% | 93.33% | 83.33% |

**3.1 Audit Results for Call Completion Rate (CCR)**

| Traffic statistics - Call Completion Rate | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total local call attempts | | 1035823 | 2688785 | 4330895 | NA |
| Total number of successful local calls | | 731122 | 2525486 | 4318060 | NA |
| Call Completion Rate (CCR) in the local network | ≥ 55% | 70.58% | 93.93% | 99.70% | NA |

| Traffic statistics - Answer to Seizure Ratio | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total number of calls processed by the switch | | 142868 | NA | NA | 1081724 |
| Total number of calls answered | | 83460 | NA | NA | 981263 |
| Answer to Seizure Ratio (ASR) | ≥ 75% | 58.42% | NA | NA | 90.71% |

**3.2 Live measurement results for Call Completion Rate (CCR)**

| Traffic statistics - Call Completion Rate | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total local call attempts | | 114417 | 169527 | 348627 | NA |
| Total number of successful local calls | | 75417 | 152921 | 348067 | NA |
| Call Completion Rate (CCR) in the local network | ≥ 55% | 65.91% | 90.20% | 99.84% | NA |

| Traffic statistics - Answer to Seizure Ratio | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total number of calls processed by the switch | | 14965 | NA | NA | 134756 |
| Total number of calls answered | | 8166 | NA | NA | 121433 |
| Answer to Seizure Ratio (ASR) | ≥ 75% | 54.57% | NA | NA | 90.11% |

| POI congestion | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| No. of POIs not meeting benchmark | | 0 | 0 | 0 | 0 |
| Total number of working POIs | | NA | 14 | 283 | 506 |

**4. Audit Results for Billing performance**

| Billing Performance | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| **Billing disputes – Postpaid** | | | | | |
| Total bills generated during the period | | 124426 | 67500 | 114431 | 31984 |
| Total number of bills disputed | | 63 | 54 | 6 | 4 |
| Percentage bills disputed | ≤ 0.1% | 0.05% | 0.08% | 0.01% | 0.01% |
| **Billing disputes – Prepaid** | | | | | |
| No. of charging / credit / validity complaints during the month | | NA | NA | NA | NA |
| Total no. of pre-paid customers at the end of the month | | NA | NA | NA | NA |
| Number of complaints per 100 customers | ≤ 0.1% | NA | NA | NA | NA |
| **Resolution of billing complaints** | | | | | |
| Total number of billing/charging complaints | | 2091 | 856 | 48 | 4 |
| Total complaints resolved in 4 weeks from date of receipt | | 2091 | 856 | 46 | 4 |
| Percentage complaints resolved within 4 weeks of date of receipt | 100% | 100.00% | 100.00% | 95.83% | 100.00% |
| **Period of applying credit / waiver** | | | | | |
| No. of complaints resolved in favor of the customer during the month | | 366 | 54 | 6 | 4 |
| No. of complaints disposed on account of not considered as valid complaints | | 0 | 802 | 42 | 0 |
| Percentage cases in which credit/waiver was received within 1 week | 100% | 100.00% | 100.00% | 100.00% | 100.00% |

**5. Live calling results for resolution of billing complaints**

| Resolution of billing complaints | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total Number of calls made | | 8 | 100 | 24 | 2 |
| Number of cases resolved in 4 weeks | | 7 | 95 | 24 | 2 |
| Percentage cases resolved in 4 weeks | 100% | 87.50% | 95.00% | 100.00% | 100.00% |

**6. Audit Results for Requests**

| Closure Requests | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total no. of requests received for Closures | | 791 | 1465 | 680 | 344 |
| Total no. of requests for closures attended within 7 days | | 781 | 1465 | 641 | 344 |
| Percentage of requests for closures attended within 7 days | 100% | 98.74% | 100.00% | 94.26% | 100.00% |
| Total no. of requests for closures not attended or attended beyond 7 days | | 10 | 0 | 39 | 0 |

**7.1 Audit results for customer care**

| Customer Care Assessment | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total no. of call attempts to call centre / customer care nos. during TCBH | | 17659 | 34082 | 231940 | 132389 |
| No. of calls connected and answered successfully to call centre / customer care nos. during TCBH | | 17652 | 33498 | 223599 | 132389 |
| Percentage of calls getting connected and answered | ≥ 95% | 99.96% | 98.29% | 96.40% | 100.00% |

| | | | | | |
|---|---|---|---|---|---|
| electronically | | | | | |
| Percentage of calls answered by the operators (voice to voice) within 60 seconds | ≥ 90% | 97.66% | 95.48% | 87.24% | 91.00% |

**7.2 Live calling results for customer care**

| Customer Care Assessment | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total Number of calls received | | 1300 | 100 | 100 | 100 |
| Total Number of calls getting connected and answered | | 1300 | 100 | 100 | 100 |
| Percentage calls getting connected and answered | ≥ 95% | 100.00% | 100.00% | 100.00% | 100.00% |

**7.3 Live calling results for customer care (Voice to Voice)**

| Customer Care Assessment | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total Number of calls received | | 1300 | 100 | 100 | 100 |
| Total Number of calls answered within 60 seconds | | 1300 | 100 | 98 | 100 |
| Percentage calls answered within 60 seconds | ≥ 90% | 100.00% | 100.00% | 98.00% | 100.00% |

**8. Audit results for refund of deposits**

| Refund | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total number of cases requiring refund of deposits | | 874 | 44 | 1 | 0 |
| Total number of cases where refund was made within 60 days | | 844 | 44 | 1 | 0 |
| Percentage cases in which refund was receive within 60 days | 100% | 96.57% | 100.00% | 100.00% | NA |

**9. Live calling for level 1 services**

| Level 1 services | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Total no. of calls made | | 360 | 30 | 30 | 30 |
| Calls answered in 60 sec | | 357 | 30 | 30 | 30 |
| Calls answered after 60 sec | | 3 | 0 | 0 | 0 |

**10. Exchange capacity and Subscribers**

| | Benchmark | BSNL | Airtel | TTSL | RCOM |
|---|---|---|---|---|---|
| Equipped Capacity of the exchange | | 368312 | 136409 erlangs | 55632 erlangs | 256000 |
| Total number of customers served | | 199926 | 114476 | 154687 | 83370 |

# 20.0 Annexure - I (Wireless)

## 20.1 Service provider performance report based on one month data

| Name of Service Provider | Network Availability | | Connection Establishment (Accessibility) | | | Connection Maintenance (Retainability) | | | Metering and Billing | | | | Response time to customer for assistance | | Termination / closure of service | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BTSs Accumulated downtime (not available for service) | Worst affected BTSs due to downtime | Call Set-up Success Rate (within licensee's own network) | SDCCH/ Paging Chl. Congestion | TCH Congestion | Call Drop Rate (%age) | Worst affected cells having more than 3% TCH drop | %age of connection with good voice quality | Metering and billing credibility (Postpaid) | Metering and billing credibility (Prepaid) | %age complaints resolved within 4 weeks | Period of applying credit/waiver less than 1 week | Accessibility of call centre/ customer care | Percentage of calls answered by operators within 60 sec | %age requests for Termination complied within 7 days | Refund of deposits after closure within 60 days |
| Benchmark | ≤ 2% | ≤ 2% | ≥ 95% | ≤ 1% | ≤ 2% | ≤ 2% | ≤ 5% | ≥ 95% | ≤ 0.1% | ≤ 0.1% | 100% | 100% | ≥ 95% | ≥ 90% | 100% | 100% |
| Airtel | 0.03% | 0.32% | 99.02% | 0.36% | 0.58% | 0.72% | 2.84% | 99.04% | 0.08% | 0.00% | 100.00% | 100.00% | 98.91% | 93.16% | 100.00% | 100.00% |
| Aircel | 0.05% | 0.00% | 99.32% | 0.02% | 0.03% | 0.40% | 4.14% | 97.80% | 0.49% | 0.10% | 98.76% | 100.00% | 100.00% | 94.19% | 60.61% | 100.00% |
| BSNL | 0.48% | 0.65% | 95.20% | 0.45% | 1.06% | 1.59% | 5.87% | 98.00% | 0.01% | 0.16% | 100.00% | 100.00% | 99.46% | 93.00% | NA | 100.00% |
| Idea | 0.01% | 0.00% | 99.88% | 0.42% | 0.45% | 0.63% | 3.74% | 96.32% | 0.09% | 0.00% | 100.00% | 100.00% | 96.97% | 91.43% | 100.00% | 100.00% |
| RCOM CDMA | 0.17% | 0.33% | 99.43% | 0.00% | 0.09% | 0.96% | 2.48% | 99.22% | 0.01% | 0.00% | 100.00% | 100.00% | 100.00% | 73.53% | 100.00% | 100.00% |
| RCOM GSM | 0.22% | 0.29% | 99.03% | 0.04% | 0.06% | 0.60% | 1.64% | 98.95% | 0.00% | 0.00% | 100.00% | 100.00% | 100.00% | 62.75% | 100.00% | 100.00% |
| Tata CDMA | 0.02% | 0.00% | 98.78% | 0.45% | 3.00% | 0.45% | 2.08% | 97.90% | 0.02% | 0.04% | 97.00% | 100.00% | 96.29% | 93.65% | 88.46% | 99.32% |
| DoCoMo | 0.21% | 0.69% | 99.05% | 0.92% | 0.62% | 1.11% | 9.30% | 95.82% | 2.72% | 0.02% | 100.00% | 100.00% | 36.85% | 51.00% | 100.00% | NA |
| Uninor | 0.08% | 0.19% | 99.23% | 0.03% | 0.02% | 0.25% | 3.53% | 99.11% | NA | 0.22% | 100.00% | 95.00% | 100.00% | 100.00% | NA | NA |
| Vodafone | 0.03% | 0.01% | 99.23% | 0.19% | 0.38% | 0.55% | 3.37% | 98.65% | 0.07% | 0.01% | 100.00% | 100.00% | 100.00% | 94.42% | 100.00% | 100.00% |



Not meeting the benchmark

## 20.2 Monthly Point of Interconnection (POI) Congestion Report

| Name of the Service Provider | Name of POI not meeting the benchmark | Total No. of circuits on POI | Total No. of call attempts on POI | Total traffic served on POI (Erlang) | % of Congestion POI | Action already taken/ action plan for meeting the benchmark |
|---|---|---|---|---|---|---|
| Airtel | All POIs meeting benchmark | | | | | |
| Aircel | Uninor | 30 | 2479 | 36 | 2.70% | 2E1s Augmented. Delay due to media issue at Uninor end |
| | Cellone | 154 | 8143 | 152 | 1.60% | 20E1s augmentation in process. Delay at BSNL end |
| BSNL | All POIs meeting benchmark | | | | | |
| Idea | All POIs meeting benchmark | | | | | |
| RCOM | HYDERABAD SECUNDERABADLL-1 TAX | 145 | 6257 | 132 | More than 100% utilized | |
| | Cellone BSNL-GSM | 31 | 620 | 21.14 | | |
| | Airtel_VJWD MSC1_RIM (9493) | 1673 | 100744 | 1637 | | |
| | Unitech Hyd | 216 | 10617 | 209.5 | | |
| | NFWT-AIRTEL GMSC HYD (9491) | 959 | 60968 | 935 | | |
| | FWT-AIRTEL MSC HYD (9497) | 525 | 26255 | 494.52 | | |
| | IDEA HYD RIM 9480 | 184 | 11344 | 162 | | |
| Tata CDMA | Idea-3 Mobile from Vijayawada GMSC | 1240 | 84717 | 1231.28 | 1.47% | Idea is not ready to augment E1 with us |
| | Idea-3 Mobile from Vijayawada GMSC | 680 | 48887 | 656.08 | 3.03% | Idea is not ready to augment E1 with us |
| | HYD BSNL LEX - GSM | 1550 | 124331 | 1545.39 | 16.83% | POI completed with Uppal GMSC |
| | HYD BSNL TAX - GSM | 892 | 55179 | 885.36 | 1.07% | Augmentation proposed with BSNL |
| | Reliance NLD POI | 463 | 17571 | 460.92 | 17.52% | RIL outgoing augmentation in process |
| DoCoMo | All POIs meeting benchmark | | | | | |
| Uninor | Airtel O/G | 464 | 21451 | 457.19 | 0.05% | E1s added |
| | BTSOL NLD | 30 | 947.33 | 19.61 | 0.42% | NLD operator to augment |
| | Vodafone NLD | 60 | 625.66 | 13.09 | 0.48% | NLD operator to augment |
| Vodafone | All POIs meeting benchmark | | | | | |

## 20.3 Parameter wise performance reports for Cellular Mobile services

### 1. Network Availability

### Audit Results for Network Availability

| | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of BTSs in the licensed service area | | 8954 | 2219 | 3540 | 5906 | 2415 | 3053 | 1200 | 2884 | 1561 | 7441 |
| Sum of downtime of BTSs in a month (in hours) | | 1819 | 830 | 12534 | 419 | 3107 | 4978 | 174 | 4444 | 924 | 1830 |
| BTSs accumulated downtime (not available for service) | ≤ 2% | 0.03% | 0.05% | 0.48% | 0.01% | 0.17% | 0.22% | 0.02% | 0.21% | 0.08% | 0.03% |
| Number of BTSs having accumulated downtime >24 hours | | 29 | 0 | 23 | 0 | 8 | 9 | 0 | 20 | 3 | 1 |
| Worst affected BTSs due to downtime | ≤ 2% | 0.32% | 0.00% | 0.65% | 0.00% | 0.33% | 0.29% | 0.00% | 0.69% | 0.19% | 0.01% |

### 2. Connection Establishment (Accessibility)

### Audit Results for CSSR, SDCCH and TCH congestion

| CSSR | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CSSR | ≥ 95% | 99.02% | 99.32% | 95.20% | 99.88% | 99.43% | 99.03% | 98.78% | 99.05% | 99.23% | 99.23% |

| SDCCH congestion | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SDCCH/Paging channel congestion | ≤ 1% | 0.36% | 0.02% | 0.45% | 0.42% | 0.00% | 0.04% | 0.45% | 0.92% | 0.03% | 0.19% |

| TCH congestion | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TCH congestion | ≤ 2% | 0.58% | 0.03% | 1.06% | 0.45% | 0.09% | 0.06% | 3.00% | 0.62% | 0.02% | 0.38% |

### Live measurement results for CSSR, SDCCH and TCH congestion

| CSSR | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CSSR | ≥ 95% | 99.03% | 99.51% | 96.00% | 99.85% | 99.35% | 98.90% | 98.72% | 98.08% | 99.43% | 99.10% |

| SDCCH congestion | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SDCCH/Paging channel congestion | ≤ 1% | 0.33% | 0.01% | 0.74% | 0.98% | 0.00% | 0.04% | 0.38% | 0.39% | 0.11% | 0.18% |

| TCH congestion | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TCH congestion | ≤ 2% | 0.52% | 0.04% | 1.94% | 1.49% | 0.14% | 0.20% | 2.00% | 0.47% | 0.04% | 0.54% |

### Drive test results for CSSR (Average of three drive tests) and blocked calls

| CSSR | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of call attempts | | 474 | 420 | 476 | 450 | 508 | 562 | 469 | 456 | 360 | 452 |
| Total number of successful calls | | 474 | 420 | 402 | 450 | 508 | 551 | 469 | 450 | 360 | 452 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| established | | | | | | | | | | | |
| CSSR | ≥ 95% | 100.00% | 100.00% | 84.45% | 100.00% | 100.00% | 98.04% | 100.00% | 98.68% | 100.00% | 100.00% |

| Blocked calls | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| %age blocked calls | | 0.00% | 0.00% | 15.55% | 0.00% | 0.00% | 1.96% | 0.00% | 1.32% | 0.00% | 0.00% |

### 3. Connection Maintenance (Retainability)

## Audit Results for Call drop rate and for number of cells having more than 3% TCH

| Call drop rate | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of calls established | | 588118058 | 24386978 | 126344489 | 287757923 | DNA | DNA | 123907906 | 90576259 | 304350 | 5682359 |
| Total number of calls dropped | | 4227280 | 96974 | 2010206 | 1810979 | DNA | DNA | 557586 | 1007968 | 759 | 31353 |
| Call drop rate | ≤ 2% | 0.72% | 0.40% | 1.59% | 0.63% | 0.96% | 0.60% | 0.45% | 1.11% | 0.25% | 0.55% |

| Cells having more than 3% TCH | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of cells in the network | | 25367 | 6790 | 9162 | 17523 | 2415 | 9159 | 1200 | 8216 | 144515 | 22282 |
| Total number of cells having more than 3% TCH | | 721 | 281 | 538 | 655 | 60 | 150 | 25 | 764 | 5106 | 750 |
| Worst affected cells having more than 3% TCH | ≤ 5% | 2.84% | 4.14% | 5.87% | 3.74% | 2.48% | 1.64% | 2.08% | 9.30% | 3.53% | 3.37% |

## Live measurement results for Call drop rate and for number of cells having more than 3% TCH

| Call drop rate | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of calls established | | 67245193 | 2749276 | 13136614 | 9575209 | DNA | DNA | 12198647 | 9403259 | 359468 | 5675381 |
| Total number of calls dropped | | 425806 | 10376 | 243979 | 62154 | DNA | DNA | 52934 | 89044 | 980 | 31052 |
| Call drop rate | ≤ 2% | 0.63% | 0.38% | 1.86% | 0.65% | 0.77% | 0.65% | 0.43% | 0.95% | 0.27% | 0.55% |

| Cells having more than 3% TCH | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of cells in the network | | 25210 | 6317 | 27486 | 17607 | 7275 | 30180 | 1203 | 8726 | 14322 | 22299 |
| Total number of cells having more than 3% TCH | | 722 | 219 | 1360 | 671 | 102 | 430 | 23 | 659 | 459 | 976 |
| Worst affected cells having more than 3% TCH | ≤ 5% | 2.86% | 3.47% | 4.95% | 3.81% | 1.40% | 1.42% | 1.91% | 7.55% | 3.20% | 4.38% |

## Drive test results for Call drop rate (Average of three drive tests)

| Call drop rate | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of calls established | | 473 | 420 | 402 | 450 | 523 | 551 | 469 | 453 | 360 | 452 |
| Total number of calls dropped | | 0 | 0 | 16 | 0 | 1 | 9 | 0 | 8 | 0 | 0 |
| Call drop rate | ≤ 2% | 0.00% | 0.00% | 3.98% | 0.00% | 0.19% | 1.63% | 0.00% | 1.77% | 0.00% | 0.00% |

### 4. Voice quality

## Audit Results for Voice quality

| Voice quality | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of sample calls | | 51158334563 | DNA | DNA | DNA | DNA | DNA | DNA | 90576259 | 23389055 | 21633871178 |
| Total number of calls with good voice quality | | 50665194294 | DNA | DNA | DNA | DNA | DNA | DNA | 86788722 | 23180515 | 21341557910 |
| %age calls with good voice quality | ≥ 95% | 99.04% | 97.80% | 98.00% | 96.32% | 99.22% | 98.95% | 97.90% | 95.82% | 99.11% | 98.65% |

## Drive test results for Voice quality (Average of three drive tests)

| Voice quality | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of sample calls | | 768232 | 107389 | 405427 | 812067 | 63000 | 139516 | 65589 | 63499 | 111571 | 885899 |
| Total number of calls with good voice quality | | 752073 | 104626 | 391191 | 797485 | 62781 | 134177 | 65127 | 59784 | 109761 | 867968 |
| %age calls with good voice quality | ≥ 95% | 97.90% | 97.43% | 96.49% | 98.20% | 99.65% | 96.17% | 99.30% | 94.15% | 98.38% | 97.98% |

### 5. POI Congestion

## Audit Results for POI Congestion

| POI congestion | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No. of POIs not meeting benchmark | | 0 | 2 | 0 | 0 | 7 | 7 | 5 | 0 | 3 | 0 |
| Total number of working POIs | | 45 | 45 | 16 | 177 | 154 | 154 | 283 | 3 | 40 | 49 |

# Live measurement results for POI congestion

## 6. Inter Operator Call Assessment

| Inter operator call Assessment To ↓ From → | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|
| Airtel | NA | 100% | 98% | 100% | 100% | 99% | 99% | 99% | 99% | 100% |
| Aircel | 100% | NA | 98% | 99% | 100% | 99% | 99% | 100% | 100% | 100% |
| BSNL | 100% | 100% | NA | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Idea | 100% | 100% | 100% | NA | 100% | 100% | 100% | 100% | 100% | 100% |
| RCOM CDMA | 100% | 97% | 100% | 100% | NA | 100% | 98% | 100% | 99% | 100% |
| RCOM GSM | 100% | 99% | 100% | 100% | 100% | NA | 97% | 100% | 100% | 100% |
| Tata CDMA | 100% | 100% | 100% | 100% | 100% | 100% | NA | 99% | 100% | 100% |
| DoCoMo | 100% | 99% | 97% | 100% | 100% | 99% | 96% | NA | 99% | 100% |
| Uninor | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | NA | 100% |
| Vodafone | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | NA |

The maximum problem faced by the calling operator to other operators

## 7. Metering and Billing credibility

# Audit Results for Billing performance

| Billing Performance | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Billing disputes – Postpaid** | | | | | | | | | | | |
| Total bills generated during the period | | 603511 | 5283 | 151685 | 133746 | 189449 | 2885 | 206702 | 17092 | NA | 234643 |
| Total number of bills disputed | | 492 | 26 | 10 | 127 | 27 | 0 | 48 | 465 | NA | 161 |
| Percentage bills disputed | ≤ 0.1% | 0.08% | 0.49% | 0.01% | 0.09% | 0.01% | 0.00% | 0.02% | 2.72% | NA | 0.07% |
| **Billing disputes – Prepaid** | | | | | | | | | | | |
| Number of complaints related to charging, credit & validity | | 6 | 940 | 7539 | 205 | 179 | 52 | 1017 | 954 | 608 | 509 |
| Total number of prepaid customers in that period | | 12351676 | 973988 | 4730955 | 5715460 | 4789928 | 1531235 | 2568871 | 3891797 | 279797 | 5229629 |
| Percentage of complaints | ≤ 0.1% | 0.00% | 0.10% | 0.16% | 0.00% | 0.00% | 0.00% | 0.04% | 0.02% | 0.22% | 0.01% |

| Resolution of billing complaints | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of billing/charging complaints | | 498 | 966 | 7549 | 332 | 1114 | 287 | 1628 | 465 | 608 | 670 |
| Total complaints resolved in 4 weeks from date of receipt | | 498 | 954 | 7549 | 332 | 1114 | 287 | 1579 | 465 | 608 | 670 |
| Percentage complaints resolved within 4 weeks of date of receipt | 100% | 100.00% | 98.76% | 100.00 % | 100.00 % | 100.00 % | 100.00 % | 97.00% | 100.00% | 100.00 % | 100.00% |
| **Period of applying credit / waiver** | | | | | | | | | | | |
| No. of complaints resolved in favor of the customer during the month | | 486 | 266 | 0 | 283 | 206 | 52 | 1605 | 444 | 454 | 449 |
| No. of complaints disposed on account of not considered as valid complaints | | 0 | 700 | 0 | 4457 | 908 | 235 | 563 | 21 | 122 | 221 |
| Percentage cases in which credit/waiver was received within 1 week | 100% | 100.00% | 100.00 % | 100.00 % | 100.00 % | 100.00 % | 100.00 % | 100.00 % | 100.00% | 95.00% | 100.00% |

## Live calling results for resolution of billing complaints

| Resolution of billing complaints | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Number of calls made | | 100 | 100 | 7 | 100 | 52 | 100 | 100 | 50 | 100 | 100 |
| Number of cases resolved in 4 weeks | | 100 | 92 | 7 | 84 | 50 | 98 | 53 | 42 | 95 | 93 |
| Percentage cases resolved in four weeks | 100% | 100.00% | 92.00% | 100.00% | 84.00% | 96.15% | 98.00% | 53.00% | 84.00% | 95.00% | 93.00% |

### 8. Customer Care

## Audit results for customer care

| Customer Care Assessment | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of call attempts to customer care | | 40132456 | 1850158 | 3191222 | 12702306 | 1859721 | 1060082 | 1117605 | 4892872 | 207583 | 3950048 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| for assistance | | | | | | | | | | | |
| Number of calls getting connected and answered (electronically) | | 39696890 | 1850158 | 3173941 | 12316908 | 1859721 | 1060082 | 1076088 | 1803198 | 207583 | 3950048 |
| Percentage calls getting connected and answered | ≥ 95% | 98.91% | 100.00% | 99.46% | 96.97% | 100.00% | 100.00% | 96.29% | 36.85% | 100.00% | 100.00% |
| Percentage calls answered within 60 seconds (V2V) | ≥ 90% | 93.16% | 94.19% | 93.00% | 91.43% | 73.53% | 62.75% | 93.65% | 51.00% | 100.00% | 94.42% |

## Live calling results for customer care

| Customer Care Assessment | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Number of calls received | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Total Number of calls getting connected and answered | | 100 | 100 | 100 | 100 | 95 | 100 | 90 | 100 | 100 | 100 |
| Percentage calls getting connected and answered | ≥ 95% | 100.00% | 100.00% | 100.00% | 100.00% | 95.00% | 100.00% | 90.00% | 100.00% | 100.00% | 100.00% |

## Live calling results for customer care (Voice to Voice)

| Customer Care Assessment | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Number of calls received | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Total Number of calls answered within 60 seconds | | 99 | 100 | 75 | 100 | 95 | 98 | 85 | 92 | 97 | 99 |
| Percentage calls answered within 60 seconds | ≥ 90% | 99.00% | 100.00% | 75.00% | 100.00% | 95.00% | 98.00% | 85.00% | 92.00% | 97.00% | 99.00% |

### 9. Termination / closure of service

## Audit results for termination / closure of service

| Termination | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of closure request | | 7348 | 66 | 0 | 2794 | 642 | 10 | 3164 | 511 | 0 | 2682 |
| Number of requests attended within 7 days | | 7348 | 40 | 0 | 2794 | 642 | 10 | 2799 | 511 | 0 | 2682 |
| Percentage cases in which termination done within 7 days | 100% | 100.00% | 60.61% | NA | 100.00% | 100.00% | 100.00% | 88.46% | 100.00% | NA | 100.00% |

### Audit results for refund of deposits

| Refund | Benchmark | Airtel | Aircel | BSNL | Idea | RCOM CDMA | RCOM GSM | Tata CDMA | DoCoMo | Uninor | Vodafone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of cases requiring refund of deposits | | 877 | 3 | 15 | 946 | 1397 | 2 | 1327 | 0 | 0 | 47 |
| Total number of cases where refund was made within 60 days | | 877 | 3 | 15 | 946 | 1397 | 2 | 1318 | 0 | 0 | 47 |
| Percentage cases in which refund was receive within 60 days | 100% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 99.32% | NA | NA | 100.00% |

| 11. Additional Network Related parameters | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Audit Results for Total Traffic Handled in Erlang** | | | | | | | | | | | |
| **Traffic in Erlang** | | **Airtel** | **Aircel** | **BSNL** | **Idea** | **RCOM CDMA** | **RCOM GSM** | **Tata CDMA** | **DoCoMo** | **Uninor** | **Vodafone** |
| Equipped capacity of the network | | 546350 | 58210 | 152000 | 225803 | 316000 | DNP | 217772 | 145000 | 44000 | 141350 |
| Total traffic handled in erlang during TCBH | | 440900 | 9271 | 94715 | 162501.58 | 105029 | DNP | 74230 | 65092 | 2781.63 | 102202 |

| Total number of customers as per VLR | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Airtel** | **Aircel** | **BSNL** | **Idea** | **RCOM CDMA** | **RCOM GSM** | **Tata CDMA** | **DoCoMo** | **Uninor** | **Vodafone** |
| Total no. of customers served (as per VLR) | | 11865265 | 597400 | 3048356 | 5540736 | 3405011 | DNP | 2065908 | 2060970 | 117080 | 3132855 |

# 21.0 Annexure – I (Broadband)

## 21.1 Parameter wise performance reports for Broadband services

### 1. Service Provisioning

| 1.1 Audit Results for Service provisioning | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Benchmark** | **Airtel** | **BSNL** | **Hathway** | **RCOM** | **Sify** | **You Telecom** | **VSNL** |
| Total connections registered during the period | | 2480 | 9724 | 1890 | 78 | 280 | 928 | 436 |
| Number of connections provided within 15 days | | 2480 | 9311 | 1890 | 78 | 280 | 925 | 435 |
| Percentage of connections provided within 15 days | 100% | 100.00% | 95.75% | 100.00% | 100.00% | 100.00% | 99.68% | 99.77% |
| Number of connections provided after 15 days of registration of demand | | 0 | 302 | 0 | 0 | 0 | 3 | 1 |
| Number of customers to whom credit is given for delayed connections | | 0 | 0 | 0 | 0 | 0 | 3 | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Percentage of customers to whom credit is given for delayed connections | 100% | NA | 0.00% | NA | NA | NA | 100.00% | 0.00% |

| 1.2 Live calling for Service provisioning | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
| Total connections registered during the period | | 100 | 100 | 100 | 36 | 100 | 100 | 100 |
| Number of connections provided within 15 days | | 99 | 96 | 100 | 36 | 99 | 97 | 82 |
| Percentage of connections provided within 15 days | 100% | 99.00% | 96.00% | 100.00% | 100.00% | 99.00% | 97.00% | 82.00% |

## 2. Fault Incidence / Clearance Statistics

| 2.1 Audit Results for Fault repair | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Fault repair | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
| Total No. of faults registered during the month | | 1377 | 6479 | 10181 | 299 | 1280 | 1557 | 14719 |
| No. of faults repaired by next working day during the month | | 1314 | 4989 | 9285 | 299 | 1141 | 1335 | 14084 |
| Percentage of faults repaired by next working day during the month | > 90% | 95.42% | 77.00% | 91.20% | 100.00% | 89.14% | 85.74% | 95.69% |
| No. of faults repaired within 3 days during the month | | 1366 | 6182 | 10145 | 299 | 1280 | 1499 | 14590 |
| Percentage of faults repaired within 3 days during the month | >99% | 99.20% | 95.42% | 99.65% | 100.00% | 100.00% | 96.27% | 99.12% |

| Rent rebate | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| No. of cases with faults pending for >3 days and ≤7 days | | 17 | 0 | 1 | 0 | 13 | 57 | 283 |
| Out of these number of cases where rent rebate for 7 days was given | | 17 | 0 | 1 | 0 | 12 | 57 | 240 |
| Percentage of cases where rent rebate for 7 days was given | 100% | 100.00% | NA | 100.00% | NA | 92.31% | 100.00% | 84.81% |
| No. of cases with faults pending for >7 days and ≤15 days | | 1 | 0 | 7 | 0 | 0 | 1 | 80 |
| Out of these number of cases where rent rebate for 15 days was given | | 1 | 0 | 7 | 0 | 0 | 1 | 24 |
| Percentage of cases where rent rebate for 15 days was given | 100% | 100.00% | NA | 100.00% | NA | NA | 100.00% | 30.00% |
| No. of cases with faults pending for ≥15 days | | 0 | 0 | 0 | 0 | 0 | 0 | 22 |
| Out of these number of cases where rent rebate for 30 days was given | | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| Percentage of cases where rent rebate for 30 days was given | 100% | NA | NA | NA | NA | NA | NA | 31.82% |

| 2.2 Live calling for fault repair | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Fault repair | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
| Total Number of calls made | | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| Number of cases where fauls were repaired by next working day | | 29 | 5 | 29 | 6 | 7 | 9 | 6 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Percentage cases where faults were repaired by next working day | > 90% | 96.67% | 16.67% | 96.67% | 20.00% | 23.33% | 30.00% | 20.00% |
| Number of cases where faults were repaired within 3 days | | 30 | 21 | 29 | 21 | 17 | 17 | 22 |
| Percentage cases where faults were repaired within 3 days | >99% | 100.00% | 70.00% | 96.67% | 70.00% | 56.67% | 56.67% | 73.33% |

## 3. Billing performance

**3.1 Audit Results for Billing performance**

| Billing Performance | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| **Billing diputes** | | | | | | | | |
| Total bills generated during the period | | 67500 | 114678 | 8000 | 9598 | NA | 6325 | 119014 |
| Total number of bills disputed | | 33 | 80 | 145 | 8 | NA | 9 | 593 |
| Percentage bills disputed | < 2% | 0.05% | 0.07% | 1.81% | 0.08% | NA | 0.14% | 0.50% |
| **Resolution of billing complaints** | | | | | | | | |
| Total number of complaints resolved in four weeks from date of receipt | | 469 | 60 | 160 | 8 | NA | 9 | 95 |
| Total complaints resolved in 4 weeks from date of receipt | | 469 | 60 | 160 | 8 | NA | 9 | 95 |
| Percentage complaints resolved within 4 weeks of date of receipt | 100% | 100.00% | 100.00% | 100.00% | 100.00% | NA | 100.00% | 100.00% |
| **Period of refund** | | | | | | | | |
| Total number of cases requiring refund | | 1 | 741 | 65 | 11 | NA | 95 | 0 |
| Total number of cases where credit/waiver was made within 60 days | | 1 | 741 | 61 | 11 | NA | 54 | 0 |
| Percentage cases in which credit/waiver was received within 60 days | 100% | 100.00% | 100.00% | 93.85% | 100.00% | NA | 56.84% | NA |

**3.2 Live calling results for resolution of billing complaints**

| Resolution of billing complaints | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| Total Number of calls made | | 80 | 52 | 100 | 4 | NA | 2 | 34 |
| Number of cases resolved in 4 weeks | | 77 | 52 | 100 | 3 | NA | 2 | 19 |
| Percentage cases resolved in 4 weeks | 100% | 96.25% | 100.00% | 100.00% | 75.00% | NA | 100.00% | 55.88% |

## 4. Response time to the customer for assistance

**4.1 Audit results for customer care (Voice to Voice)**

| Customer Care Assessment | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| Total Number of calls received | | 36014 | 6503 | 33763 | 232418 | 1714 | 12550 | 290409 |
| Total Number of calls answered within 60 seconds | | 34404 | 6174 | 33763 | 190583 | 1714 | 11166 | 286393 |
| Percentage calls answered within 60 seconds | > 60% | 95.53% | 94.94% | 100.00% | 82.00% | 100.00% | 88.97% | 98.62% |

**4.2 Live calling results for customer care (Voice to Voice)**

| Customer Care Assessment | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| Total Number of calls received | | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Total Number of calls answered within 60 seconds | | 98 | 100 | 100 | 85 | 95 | 100 | 83 |
| Percentage calls answered within 60 seconds | > 60% | 98.00% | 100.00% | 100.00% | 85.00% | 95.00% | 100.00% | 83.00% |

**4.3 Audit results for customer care (Voice to Voice)**

| Customer Care Assessment | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| Total Number of calls received | | 36014 | 6503 | 33763 | 232418 | 1714 | 12550 | 290409 |
| Total Number of calls answered within 90 seconds | | 35053 | 6464 | 33763 | 195231 | 1714 | 11667 | 286511 |
| Percentage calls answered within 90 seconds | > 80% | 97.33% | 99.40% | 100.00% | 84.00% | 100.00% | 92.96% | 98.66% |

**4.4 Live calling results for customer care (Voice to Voice)**

| Customer Care Assessment | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| Total Number of calls received | | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Total Number of calls answered within 90 seconds | | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Percentage calls answered within 90 seconds | > 80% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

## 5. Bandwidth utilization

**5.1 Audit results for Bandwidth Utilization**

| Bandwidth utilization | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| Intra-network links (POP to ISP Node) | | | | | | | | |
| Total number of intra network links | | 254 | 152 | 6 | 19 | 420 | NA | 16 |
| No of Intra network found to be above 90% | | 0 | 4 | 0 | 0 | 0 | NA | 0 |
| International Bandwidth | | | | | | | | |
| Total number of upstream links | | 1 | 296 | 5 | 9 | 23 | 4 | 38 |
| Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs) | | 2640 | 45880 | 433.5 | 44544 | 2935 | 38 | 53062 |
| Total International Bandwidth utilised during peak hours | | 2262.7 | 36904.96 | 381 | 17745 | 2563 | 29 | 21641 |
| Percentage Bandwidth utilisation during peak hours (In mpbs) | <80% | 85.71% | 80.44% | 87.89% | 39.84% | 87.33% | 76.32% | 40.78% |
| No of Intra network found to be above 90% | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**5.2 Live measurment results for Bandwidth Utilization**

| Bandwidth utilization | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
|---|---|---|---|---|---|---|---|---|
| Intra-network links (POP to ISP Node) | | | | | | | | |
| Total number of intra network links | | 254 | 152 | 6 | 19 | 420 | NA | 16 |
| No of Intra network found to be above 90% | | 0 | 0 | 0 | 0 | 0 | NA | 0 |
| International Bandwidth | | | | | | | | |
| Total number of upstream links | | 1 | 325 | 5 | 9 | 23 | 4 | 38 |
| Total International Bandwidth available from | | 2640 | 50375 | 433.5 | 44544 | 2935 | 114 | 53062 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ISP Node to IGSP/NIXI/NAP (In mpbs) | | | | | | | | |
| Total International Bandwidth utilised during peak hours | | 2154.7 | 33027.33 | 373 | 17745 | 2563 | 78 | 21641 |
| Percentage Bandwidth utilisation during peak hours (In mpbs) | <80% | 81.62% | 65.56% | 86.04% | 39.84% | 87.33% | 68.42% | 40.78% |
| No of Intra network found to be above 90% | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## 6. Broadband download speed

| 6.2 Live calling results for broadband download speed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Broadband download speed | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
| Total committed download speed to the sample subscribers (In mpbs) (A) | | 2 | 2 | 1 | 1 | 1 | 2 | 2 |
| Total average download speed observed during TCBH (In Mpbs) (B) | | 2.19 | 1.8 | 0.82 | 0.9 | 0.95 | 1.7 | 2 |
| %age subscribed speed available to the subscriber during TCBH (B/A)*100 | >80% | 109.50% | 90.00% | 82.00% | 90.00% | 95.00% | 85.00% | 100.00% |

## 7. Service availability/uptime

| 7.1 Audit results for service availability | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Service Availability | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
| Total Operational Hours | | 744 | 117600 | 672 | 570888 | 672 | 5175264 | 1712928 |
| Total Downtime | | 0.024 | 63 | 3.6 | 19.47 | 0 | 83375 | 34005 |
| Total time when the service was available | | 743.976 | 117537 | 668.53 | 570868.53 | 672 | 5091889 | 1678923 |
| Service Availability Uptime in Percentage | >98% | 100.00% | 99.95% | 99.48% | 100.00% | 100.00% | 98.39% | 98.01% |

| 7.2 Live measurement results for service availability | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Service Availability | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
| Total Operational Hours | | 4520232 | 12600 | 72 | 632832 | 72 | 1018176 | 142744 |
| Total Downtime | | 165 | 9.71 | 0.14 | 2.47 | 1 | 0 | 1941 |
| Total time when the service was available | | 4520067 | 12590 | 71.45 | 632829.53 | 71 | 1018176 | 140803 |
| Service Availability Uptime in Percentage | >98% | 100.00% | 99.92% | 99.24% | 100.00% | 98.61% | 100.00% | 98.64% |

## 8. Network latency / Packet loss

| 8.1 Audit results for Latency and packet loss | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Network Latency and Packet Loss | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
| Packet Loss (Percentage) | < 1% | 0.00% | 0.00% | 0.10% | 0.15% | 0.00% | 0.10% | 0.00% |
| Network Latency | | | | | | | | |
| From user reference point at POP/ISP Node to IGSP/ NIXI (msec) | <120msec | 25 | 20 | 5 | 0 | < 45 | 14 | < 80 |
| From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec) | <350msec | 242 | 242 | 244 | 15.8 | < 300 | 250 | < 250 |

| 8.2 Live measurement results for Latency and packet loss | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Network Latency and Packet Loss | Benchmark | Airtel | BSNL | Hathway | RCOM | Sify | You Telecom | VSNL |
| Packet Loss (Percentage) | < 1% | 0.00% | 0.00% | 0.10% | 0.00% | 0.00% | 0.10% | 0.00% |
| Network Latency | | | | | | | | |
| From user reference point at POP/ISP Node to IGSP/ NIXI (msec) | <120msec | 41 | 19 | 1 | 0 | 40 | 15 | 30 |
| From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec) | <350msec | 251 | 228 | 36 | 50 | 286 | 273 | 252 |

# 22.0 Annexure – II Detailed Explanation of Audit methodology (Parameter wise)

## 22.1 For Basic (Wireline) services

| 1. Provision of telephone after registration of demand | |
|---|---|
| **Computational Methodology as per QoS definition** | Percentage connections provided within 7 working days = (No. of connections provided within seven working days/ Total number of connections registered during the period of 3 months) * 100<br>Technically Non Feasible (TNF) cases such as unavailability of telephone infrastructure/ equipment in the Area or Spare Capacity for activating telephone connection shall be excluded from the calculation of this parameter. |
| **Benchmark** | 100% cases in <7 days, subject to technical feasibility |
| **Audit Procedure** | IMRB Auditors verified and collected data pertaining to number of applications received at the service provider's level in the following time frames:-<br>- Number of connections provided within 7 days<br>- Number of connections provided after 7 days<br>- Number of connections were request is still pending<br><br>**Live calling : -**<br>- Interviewers ensured that operator should provide list of all new numbers added in one month prior to IMRB staff visit.<br>- Live calling team called up at least 10% of the customers who applied for new connections during the month prior to Audit<br>- Checked and Recorded whether the connection was provided within 7 days of registration on demand |

| 2. Fault incidence/clearance related statistic | |
|---|---|
| **Computational Methodology** | **Fault incidence** = (No. of faults reported by the customer per month/ Total Number of Subscribers for that particular month)*100 |
| **Benchmark** | Total number of faults registered per month: <=5 complaints per 100 subscribers<br>Fault repair by next working day: >=90% and within 3 days: 100%, averaged over a quarter. |
| **Audit Procedure** | IMRB Auditors to verify and collect data pertaining to number of fault received at the service provider's level in the following time frames:-<br>Number of faults cleared within 24 hours<br>Number of cleared in more than 1 day but less than 3 days<br>Number of cleared in more than 3 days but less than 7 days<br>Number of cleared in more than 7 days but less than 15 days<br>Number of cleared in more than 15 days<br>**Live calling : -**<br>-Live calling to be done to verify 'Fault repair by next working day' parameter<br>-Interviewers ensured that operator provided a list of all the subscribers who reported faults in one month prior to IMRB staff visit.<br>-Calls were made to up to 10% or 30 complainants for the concerned exchange, whichever is less<br>- Auditors checked and recorded whether the fault was corrected within the timeframes as mentioned in the benchmark. |

| 3. Metering and billing credibility – billing complaints | |
|---|---|
| **Computational Methodology** | Percentage incidence of billing complaints = (No. of billing complaints reported by the customer per month/ Total Number of Subscribers for that particular month)*100<br>Percentage resolution of billing complaints = (No. of billing complaints resolved over a particular period of time/Total No. of billing complaints of that period of time)*100 |
| **Benchmark** | Percentage incidence of billing complaints: Not more than 0.1% of the bills issued<br>Percentage resolution of billing complaints: 100% within a period of 4 weeks<br>Period of applying credit/waiver/adjustment : In 100% of the cases within 1 week of resolution of complaint |
| **Audit Procedure** | IMRB Auditors to verify and collect data pertaining to<br>- Number of Billing complaints received at the service provider's level<br>- Last billing cycle stated should be such that due date for payment of bills must be beyond the date when this form is filled.<br>- Include all types of bills generated for customers. This could include online as well as other forms of bills presentation including printed bills<br>- Billing complaint is any of written complaint/ personal visit/ telephonic complaint related to: Excess metering/ wrong tariff scheme charged, Late receipt of bills/ Not received at all, Wrong name and address, Payment made in time but charged penalty/ not reflected in next bill, Last payment not reflected in bill, Adjustment/ waiver not done, Anything else related to bills, Toll free numbers charged etc.<br>**Live calling : -**<br>- IMRB Auditors collected the list of all the subscribers who have made billing complaints in the month prior to the Audit.<br>-100 such subscribers per service provider were called to check the time taken to resolve t he billing complaint. However, in some cases where number of billing complaints were less the sample size could not be achieved |

| 4. Customer care promptness (Shifts and Closures) | |
|---|---|
| **Computational Methodology** | Shifts and closure requests |
| **Benchmark** | Shifting of telephone line : Less than 3 days<br>Processing of closure request: Less than 7 days |
| **Audit procedure** | **IMRB Auditors collected and verified data pertaining to**<br>**Shifting Request: (Following key points were taken care of while verifying the data)**<br>- Date of filing form should be at least 3 working days after the date of month appraised.<br>- All the holidays are excluded and only working days are considered<br>- The number of shift requests per month does not include the pending connections of the previous months.<br>**Processing of closure request (Following key points were taken care of while verifying the data)**<br>- The operator includes all Requests for volunteer Permanent Closure and External (shifts to other exchanges) Shift requests received at their exchange.<br>- DNP (due to Non – payment) cases are excluded<br>- All holidays are excluded for calculating 7 days.<br>- Closure requests attended in the previous months are excluded<br>- The period for closure starts from the time of submission of application by the subscriber. |

| 5. Response time to customer | |
|---|---|
| **Computational Methodology** | Percentage of calls answered in a specified time = (Total no. of calls answered within that specified time / Total no. of calls dialed for a particular service)*100 |
| **Benchmark** | (i) % age of calls getting connected and answered: In 95% of the cases or more<br><br>(ii) % age of calls answered by operator / voice to voice) within 60 seconds: In 90% of the cases or more |
| **Audit Procedure** | -IMRB auditors made test calls from the exchanges to the operator's customer care / helpline / toll free numbers. They will record the time taken to connect a customer's call both to the IVR as well as to a customer care executive.<br>- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.<br>- Time to answer the call by the operator should be taken from the time auditor has pressed the requisite button for being assisted by the operator.<br>**Live calling: -**<br>- Overall sample size is 2*50 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS<br>- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.<br>- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services. |

| 6. Time taken to refund of deposits after closure | |
|---|---|
| **Computational Methodology** | Percentage of cases needing refund in a specified time = (Total no. of cases where refund was made within a particular time / Total no. of cases requiring refunds)*100 |
| **Benchmark** | Time taken to refund = 100% within 60 days |
| **Audit Procedure** | IMRB Auditors verified and collected data pertaining to<br>- Cases requiring refund of deposits after closure are to be included<br>- Time taken starts from the date on which the closure is made by the service provider and ends at the date on which refund is received by the customer<br>**Live calling : -**<br>- Collect the details of all the cases for which the refund was provided by the operator prior to the month of Audit<br>- Overall 100 number of live calls are to be made in a licensed service area/circle for each service provider (Distributed across number of exchanges selected) |

| 7. Call completion rate | |
|---|---|
| **Computational Methodology** | Call Completion Rate: Call Completion Rate (CCR) is defined as the percentage of total calls that are connected out of the total calls presented to exchange. This could be due to:-<br>Other exchange not working / lines blocked<br>Calling exchange is blocked<br>CCR = [(Call attempts – Calls blocked)/Call attempts] X 100 |
| **Benchmark** | Call Completion Rate (CCR) within local network: More than 55% |
| **Audit Procedure** | IMRB Auditors verified and collected data pertaining to Sample Traffic Data during Time Consistent Busy Hour (TCBH). These details were collected separately for<br>-Three days in which live measurement was carried out<br>- For the complete month in which audit was carried out |

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## 22.2 Cellular Mobile services

| 1. Accumulated Downtime of the Network | |
|---|---|
| **Computational Methodology as per QoS definition** | BTSs accumulated downtime (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software up gradation.<br><br>**Computational Methodology:**<br><br>• BTSs Accumulated downtime = Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month X 100<br>---<br>24 X No. of days in the month X No. of BTSs in the network in the licensed service area<br><br>• Worst affected BTSs due to downtime = No. of BTSs having accumulated downtime >24 hours in a month X 100<br>---<br>Total No. of BTSs in the network in the licensed service area |
| **Benchmark** | • BTSs Accumulated downtime (not available for service) ≤ 2%<br>• Worst affected BTSs due to downtime ≤ 2% |
| **Audit Procedure** | **IMRB** auditors collected and verified data pertaining to:<br><br>The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) used for arriving at the benchmark reported to TRAI were audit |

| 2. Call Set-Up Success Rate (CSSR) | |
|---|---|
| **Computational Methodology as per QoS definition** | The ratio of calls established to total calls is known CSSR.<br>Call Established means the following events have happened in call setup:-<br>↳ call attempt is made<br>↳ the TCH is allocated<br>↳ the call is routed to the outward path of the concerned MSC<br>Computational Methodology: Calls Established / Total Call Attempts * 100 |
| **Benchmark** | > 95% |
| **Audit Procedure** | **IMRB** auditors collected and verified data pertaining to<br>↳ The cell-wise data generated through counters/ MMC available in the switch for traffic measurements was verified by the auditors<br>↳ CSSR calculation was measured using OMC generated data only<br>↳ Measurement was done only in Time Consistent Busy Hour (TCBH) period for all days of the week |

| 3. Network Congestion Parameters | |
|---|---|
| **Computational Methodology as per QoS definition** | It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:<br>➢ SDCCH Level: Stand-alone dedicated control channel<br>➢ TCH Level: Traffic Channel<br>➢ POI Level: Point of Interconnect<br><br>**Computational Methodology:**<br>➢ **SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +…….+ (An x Cn)] / (A1 + A2 +…+ An)**<br>● Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1<br>● C1 = Average SDCCH / TCH Congestion % on day 1<br>● A2 = Number of attempts to establish SDCCH / TCH made on day 2<br>● C2 = Average SDCCH / TCH Congestion % on day 2<br>● An = Number of attempts to establish SDCCH / TCH made on day n<br>● Cn = Average SDCCH / TCH Congestion % on day n<br>➢ **POI Congestion% = [(A1 x C1) + (A2 x C2) +…….+ (An x Cn)] / (A1 + A2 +…+ An)**<br>● Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1<br>● C1 = Average POI Congestion % on day 1<br>● A2 = POI traffic offered on all POIs (no. of calls) on day 2<br>● C2 = Average POI Congestion % on day 2<br>● An = POI traffic offered on all POIs (no. of calls) on day n<br>● Cn = Average POI Congestion % on day n |
| **Benchmark** | **SDCCH Congestion: ≤ 1%**<br>**TCH Congestion: ≤ 2%**<br>**POI Congestion: ≤ 0.5%** |
| **Audit Procedure** | **IMRB Auditors collected and verified records pertaining to**:<br>➢ Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) was conducted<br>➢ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH<br>➢ The POI details were verified from the switch for all the links of the operators |

| 4. Call Drop Rate | |
|---|---|
| **Computational Methodology as per QoS definition** | The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released<br>➢ **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss<br>➢ **Total calls established** = All calls that have TCH allocation during busy hour<br><br>**Computational Methodology:**<br>Total Calls Dropped / Total Calls Established x 100 |
| **Benchmark** | **≤ 2%** |
| **Audit Procedure** | **IMRB Auditors collected and verified records pertaining to**:<br>➢ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was conducted.<br>➢ The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter |

| 5. Connections with Good Voice Quality | |
|---|---|
| **Computational Methodology as per QoS definition** | Definition:<br>➢ for GSM service providers the calls having a value of 0 – 4 are considered to be of good quality (on a seven point scale)<br>➢ For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %<br>**Computational Methodology:**<br>➢ **% Connections with good voice quality =** (No. of voice samples with good voice quality / Total number of samples) x 100 |
| **Benchmark** | **≥ 95%** |
| **Audit Procedure** | **IMRB Auditors collected and verified records pertaining to**:<br>Audit would be conducted based on the details of periodic drive tests conducted at different part of the network during Time consistent busy hour (TCBH) and used to arrive at the benchmarks reported to TRAI.<br>Procedures that were to be followed by operator for obtaining relevant details for computing this parameter were audited<br>➢ Operator to conduct at least one drive test using standard drive test equipment every week during TCBH<br>➢ Each drive test should evenly cover the following 5 types of locations:<br>➢ **3 Outdoor** (Periphery of the city, Congested Area, Across the City), and **2 Indoor** (Office Complex and Shopping Complex)<br>➢ 2 minute long calls to be initiated and held throughout the drive test<br>➢ The speed of the vehicle should be kept at around 50km/hr. (around 30 km/hr in case of geographically small cities) – This was ensured during the drive tests conducted by IMRB Auditors<br>➢ RxQual / FER samples generated during the drive test collected by the operator were verified<br>➢ *Measurements using Engineering handsets were not acceptable*<br>➢ All the operators were not maintaining this data at the switch level |

| 6. Service Coverage | |
|---|---|
| **Computational Methodology as per QoS definition** | Definition:<br>➢ The level of signal available in a particular part of a city is known as signal strength.<br>**Computational Methodology:**<br>➢ Service Coverage for route type x = [(N1 x CSS1) + (N2 x CSS2) + …..+ (Nn x CSSn)] / (N1 + N2 +……..+Nn)<br>➢ Where:-N1 = Number of calls on type of route x made in drive test 1<br>➢ CSS1 = Average coverage signal strength on type of route x in drive test 1 (in dBm)<br>➢ N2 = Number of calls on type of route x made in drive test 2<br>➢ CSS2 = Average coverage signal strength on type of route x in drive test 2 (in dBm)<br>➢ Nn = Number of calls on type of route x made in drive test n<br>➢ CSSn = Average coverage signal strength on type of route x in drive test n (in dBm) |
| **Benchmark** | **Indoor >= -75 dBm**<br>**In-vehicle >= -85 dBm**<br>**Outdoor – in city >= -95 dBm** |
| **Audit Procedure** | **IMRB Auditors collected and verified call centre records pertaining to**:<br>➢ Audit was conducted based on the details of periodic drive tests conducted at different part of the network during Time consistent busy hour (TCBH) which were used to arrive at the benchmarks reported to TRAI.<br>➢ Procedures were verified that were to be followed by operator for obtaining relevant details for computing this parameter:- |

| | |
|---|---|
| | ➢ Operator to conduct at least one drive test using standard drive test equipment* every week during Time consistent busy hour (TCBH).<br>➢ Each drive test should evenly cover the following 5 types of locations: –<br>➢ 3 Outdoor (Periphery of the city, Congested Area, Across the City), and<br>➢ 2 Indoor (Office Complex and Shopping Complex)<br>➢ *Measurements using Engineering handsets were not acceptable* |

| **7. Response time to customer** | |
|---|---|
| **Computational Methodology** | **To connect to Customer care:** The time taken to connect a person (as soon as he presses call) to the IVR of the service provider<br><br>**To connect to operator:** The time taken to connect a person (as soon as he presses 9) to the customer care executive<br><br>**Computational Methodology:**<br>• % age of calls getting connected = Total number of calls getting connected X 100 / Total number of calls made<br>• % age of calls answered within 60 sec (voice to voice) = Total number of calls answered within 60 seconds X 100 / Total number of calls made |
| **Benchmark** | ➢ % age of calls getting connected and answered ≥ 95%<br>➢ % age of calls answered by operator (voice to voice) within 60 seconds ≥ 90% |
| **Audit Procedure** | -IMRB auditors made test calls from the exchanges to the operator's customer care / helpline / toll free numbers. They will record the time taken to connect a customer's call both to the IVR as well as to a customer care executive.<br>- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.<br>- Time to answer the call by the operator should be taken from the time auditor has pressed the requisite button for being assisted by the operator.<br>**Live calling: -**<br>- Overall sample size is 2*50 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS<br>- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.<br>- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services. |

| 8.1 Billing complaints per 100 bills issued | |
|---|---|
| **Computational Methodology as per QoS definition** | Billing complaints includes any of the following complaints related to billing from the point of view of customer:<br>• Local call charges billed as STD/ISD or vice-versa<br>• Toll free numbers charged<br>• Wrong roaming charges<br>• Call made/received disputed<br>• Wrongly charged extra for some service (SIM replacement charged twice, service not used but charged etc.)<br>• Cheque submitted on time but charged penalty for paying beyond due date (in case customer is not at fault i.e. all those that operator cannot prove that he/she is not lying)<br>• Payment made but not reflected (may be wrongly adjusted to another customer etc.)<br>**Billing complaints per 100 bills issued =** Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter<br><br>* *All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included*<br><br>** *Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.* |
| **Benchmark** | < 0.1% billing complaints per 100 bills |
| **Audit Procedure** | **IMRB** auditors collected and verified data pertaining to<br>- Number of bills generated<br>- Number of billing complaints received<br>- %age complaints per 100 bills |

| 8.2 Resolution of billing complaints | |
|---|---|
| **Computational Methodology as per QoS definition** | **%age of billing complaints resolved within 4 weeks=**(Complaints resolved in 4 weeks from date of receipt / Total billing complaints received during the relevant period) x 100<br><br>*Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.*<br><br>*Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.* |
| **Benchmark** | 100% cases to be resolved within 4 weeks |
| **Audit Procedure** | **IMRB Auditors collected and verified data pertaining to**<br>- Total number of billing complaints/bills disputed<br>- Number of complaints resolved in 4 weeks<br><br>**Live calling : -**<br>**Overall 100 number of live calls** made in a licensed service area/circle for each service provider. However in certain cases the sample could not be achieved as bills disputed (prior to the month of Audit) were found to be less than100 |

| 8.3 Period of refunds / payments due to customers | |
|---|---|
| **Computational Methodology as per QoS definition** | **Period of all refunds = Maximum value of 'Time taken to refund'**<br>where:-Time taken to refund = Date of refund – date of complaint resolution |
| **Benchmark** | 100% cases in less than 1 week |
| **Audit Procedure** | **Audit of refund details and complaints (only those resulting in refunds) resolution details used for arriving at the figures reported to TRAI to be conducted.**<br>**Operator to provide details of:-**<br>• **Dates of resolution of all billing complaints resolved in favour of customer and resulting in requirement of a refund by the operator**<br>• **Dates of refund pertaining to all billing complaints received during the relevant quarter**<br>**Also random live checks of all subscribers entitled for refund were conducted** |

## 22.3 For Broadband services

| 1. Service provisioning/Activation time | |
|---|---|
| **Computational Methodology as per QoS definition** | Service provisioning time refers to the time taken from the date of receipt of an application to the date when the service is activated<br><br>**Percentage connections provided within X working days** =<br>No of connections provided within X working days/ Total number of connections registered during the period * 100<br><br>**Technically Non Feasible (TNF**) cases such as unavailability of Broadband infrastructure/ equipment in the Area or Spare Capacity i.e. Broadband Ports including equipment to be installed at the customer premises for activating Broadband connection shall be excluded from the calculation of this parameter.<br><br>Also, problems relating to customer owned equipment such as PC, LAN Card/ USB Port and internal wiring or non-availability of such equipment shall be excluded from the calculation of this parameter. |
| **Benchmark** | 100 % cases in =<15 working days. |
| **Audit Procedure** | **IMRB** auditors collected and verified data pertaining to<br>-Number of applications received at the service provider's level<br>-Number of connections provided within 15 days<br>-Number of connections provided after 15 days<br><br>**Live calling :** At least 10% of the subscribers who had requested for new connections in month prior to Audit were called to check whether connection was provided in 15 days |

| 2. Fault repair/Restoration time | |
|---|---|
| **Computational Methodology as per QoS definition** | This refers to the time taken to restore the existing customer service to operational level from the time that a problem or fault is reported<br><br>**Percentage faults repaired in X working days** = (Total no of faults repaired in X working days /Total number of faults reported during the period)*100<br><br>The time period for fault repair starts from the time when the fault is reported to the service provider either through customer care help line or in person by the subscriber<br><br>Only the complaints registered till the close of the business hours of the day are to be taken into account. All the complaints registered after the business hours are to be considered as being registered in the next day business hours |
| **Benchmark** | By next working day: > 90% and within 3 working days: 99% |
| **Audit Procedure** | **IMRB** auditors collected and verified data pertaining to<br>-Number of applications received at the service provider's level<br>-Number of connections provided within 15 days<br>-Number of connections provided after 15 days<br><br>**Live calling :** At least 10% of the subscribers who had requested for new connections in month prior to Audit were called to check whether connection was provided in 15 days |

| 3. Billing complaints per 100 bills issued | |
|---|---|
| **Computational Methodology as per QoS definition** | Billing complaints includes any of the following complaints related to billing from the point of view of customer:<br>• Wrongly charged extra for some service<br>• Cheque submitted on time but charged penalty for paying beyond due date<br>• Payment made but not reflected (may be wrongly adjusted to another customer etc.)<br><br>**Billing complaints per 100 bills issued =** Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter<br><br>* *All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included*<br><br>** *Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.* |
| **Benchmark** | < 2% billing complaints per 100 bills |
| **Audit Procedure** | **IMRB** auditors collected and verified data pertaining to<br>- Number of bills generated<br>- Number of billing complaints received<br>- %age complaints per 100 bills |

| 3.1. Resolution of billing complaints | |
|---|---|
| **Computational Methodology as per QoS definition** | **%age of billing complaints resolved within 4 weeks=**(Complaints resolved*** in 4 weeks from date of receipt / Total billing complaints** received during the period 2008 ) x 100<br><br>*Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.*<br><br>*Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.* |
| **Benchmark** | 100% cases to be resolved within 4 weeks |
| **Audit Procedure** | **IMRB Auditors collected and verified data pertaining to**<br>- Total number of billing complaints/bills disputed<br>- Number of complaints resolved in 4 weeks<br><br>**Live calling : -**<br>**-Overall 100 number of live calls** are to be made in a licensed service area/circle for each service provider. However in certain cases the sample could not be achieved as bills disputed (prior to the month of Audit) were found to be less than100 |

| 3.2 Time taken to refund after closure | |
|---|---|
| **Computational Methodology as per QoS definition** | Time taken to refund = Date of refund – Date of closure<br><br>Date of closure is considered to be the date on which the connection is discontinued in the service provider database of active customers |
| **Benchmark** | 100% cases in less than 60 days |
| **Audit Procedure** | **IMRB Auditors collected and verified data pertaining to**<br>-Number of cases requiring refund of deposits<br>-Number of cases where refund was made within 60 days<br>-%age cases where refund was made within 60 days |

| 4. Response time to customer for assistance | |
|---|---|
| **Computational Methodology as per QoS definition** | **%age of calls answered by operator (voice to voice) within n seconds** = (Number of calls where time taken for operator to respond* >= n sec / Total number of calls where an attempt to route to the operator was made) x 100<br><br>Time taken for operator to respond = Time when an operator responds to a call – Time when the relevant code to reach the operator is dialled |
| **Benchmark** | Calls answered within 60 seconds > 60 %<br>Calls answered within > 80% |
| **Audit Procedure** | **IMRB Auditors collected and verified call centre records pertaining to**<br>-Number of calls received by the operator<br>-Number and %age calls answered within **60 seconds**<br>-Number and percentage calls answered within **90 seconds**<br>**Live calling : -**<br>Overall **100 number** of live calls at **different points of time** were made in a licensed service area/circle for each service provider to assess the efficiency of the call centre |

| 5. Bandwidth Utilization | |
|---|---|
| **Computational Methodology as per QoS definition** | Percentage Bandwidth available on the link = Total Bandwidth* utilised in TCBH for the period/ Total Bandwidth Available during the period*100<br><br>Multi Router Traffic Grapher (MRTG) is to be used to measure the details of Bandwidth utilisation by service providers |
| **Benchmark** | -- < 80% link(s)/route bandwidth utilization during peak hours (TCBH).<br>-- If on any link(s)/route bandwidth utilization exceeds 90%, then network is considered to have congestion. For this additional provisioning of bandwidth on immediate basis, but not later than one month is mandated. |
| **Audit Procedure** | **IMRB Auditors collected and verified call centre records pertaining to**<br>**( I )POP to ISP gateway Node [Intra – network] Links**<br>-Auditors to verify and collect data pertaining to Total Bandwidth available and Total Bandwidth utilised during TCBH at some of the sample intra network links (POP to ISP Node) on each of the three days of live measurement separately<br>- Total Bandwidth available and Total bandwidth utilised during at the sample links TCBH for the complete month of audit<br>- Total number of intra network links having >90% bandwidth utilisation during the month of Audit<br>**(ii) ISP Gateway Node to IGSP / NIXI Node upstream Link's) for international connectivity**<br>-Total number of upstream links for International connectivity<br>-Total number of links having Bandwidth > 90%Total Bandwidth available and Total Bandwidth utilised on all the upstream links during TCBH (POP to ISP Node) on each of the three days of live measurement separately<br>-Total Bandwidth available and Total bandwidth utilised at all the international links during TCBH for the complete month of audit (Also obtain details separately for the days) |

| **Broadband download speed** | |
|---|---|
| **Computational Methodology as per QoS definition** | This refers to the ratio of size of the file to be downloaded and total time required for error free transmission of the file |
| **Benchmark** | Subscribed broadband connection speed to be met >80% from ISP Node to user |
| **Audit Procedure** | **Live calling : -**<br>-Details of live customers were obtained from the service providers<br>-Overall **50 number** of live calls at were made during peak hours in a licensed service area/circle for each service provider to assess the download speed available to subscribers. Tool provided by the on the service providers website was used for the same<br>-Details of total committed download speed and speed available to the users were recorded for each of the subscriber<br>- Percentage download speed available was calculated as = Sum of total speed available for 50 customers/Total committed download speed for 50 customers*100 |

| **Service availability/Uptime** | |
|---|---|
| **Computational Methodology as per QoS definition** | Service availability/uptime is the measure of the degree to which the broadband access network including ISP Node is operable and not in a state of failure or outage at any point of time for all users<br><br>Service availability/Uptime = (**Total operational hours – Total Downtime hrs)*100 / Total operational hours**<br><br>Total downtime for all users, including the LAN switches, Routers, Servers, Etc at ISP Node and connectivity to upstream service provider are to be included<br><br>Planned outages for routine maintenance of the system are excluded from the calculation of service availability/uptime |
| **Benchmark** | - 98% |
| **Audit Procedure** | **IMRB Auditors collected and verified call centre records pertaining to**<br>-Total operational hrs<br>-Total downtime hrs<br><br>The above mentioned data was obtained and verified separately for three days in which the live measurement was carried out, Month in which audit was carried out<br>Also, verification of old records was carried out |

| **Packet loss** | |
|---|---|
| **Computational Methodology as per QoS definition** | Packet loss is the percentage of packets lost to total packets transmitted between two designated Customer Premises Equipments/Router ports. It is the measurement of packet lost from the broadband customer (User) configuration/User reference point at POP/ISP Node to IGSP/NIXI Gateway and to the nearest NAP port abroad<br><br>The packet loss is measured by computing the percent packet loss of **1000 pings of 64 byte packet each**.<br><br>Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI<br><br>Minimum sample reference points for each service area shall be three in number or multiple reference points if required<br>**Hence Packet loss is computed by the formula - (Total number of ping packets lost during the period/Total number of ping packets transmitted)* 100** |

| | |
|---|---|
| **Benchmark** | <1 % |
| **Audit Procedure** | **IMRB Auditors collected and verified call centre records pertaining to**<br>- Records maintained for ping tests conducted<br>- Smoked ping test (wherever available) results<br>- Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours)<br>- Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle |

| **Network Latency** | |
|---|---|
| **Computational Methodology as per QoS definition** | Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/Customer Premises Equipment (CPE). The round trip delay for the ping packets from ISP premises to the IGSP premises to the IGSP/NIXI gateway and to the nearest NAP port abroad are measured by computing delay for **1000 pings of 64 bytes each** (Pings are to be sent subsequent to acknowledgement received for the same for previous ping)<br><br>Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI<br><br>Minimum sample reference points for each service area shall be three in number or multiple reference points if required<br>**Hence the formula for network latency would be Network latency for X days= Total round trip time for all the ping packets transmitted in X days /No of days during the period** |
| **Benchmark** | < 120 msec from user reference point at POP/ISP Node to International Gateway<br>< 350 msec from User reference point at ISP Gateway Node to International nearest NAP port (Terrestrial)<br>< 800 msec from User reference point at ISP Gateway Node to International nearest Nap port (Satellite) |
| **Audit Procedure** | **IMRB Auditors collected and verified call centre records pertaining to**<br>- Records maintained for ping tests conducted<br>- Smoked ping test (wherever available) results<br>- Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours)<br>- Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle |

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